REMEMBERING AND FORGETTING

T. E. PEARCE

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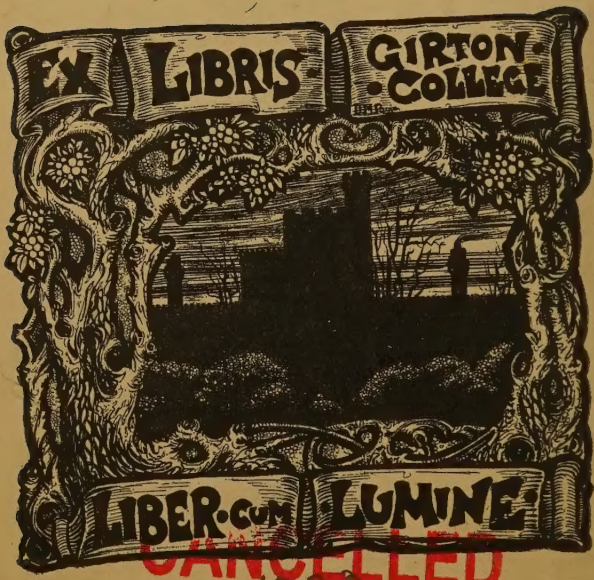

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REMEMBERING AND FORGETTING

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BY

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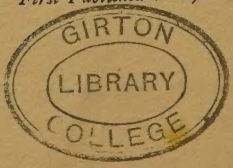

TO

MY FATHER AND MOTHER

PREFACE

WHATEVER there may be of definiteness in the structure of this book is due to the circumstances under which its first draft was made. It was necessary to compress into a few lectures enough information about ordinary remembering and forgetting to enable officers of the R.A.M.C. to estimate the abnormality of these functions in their patients. It might have been better if the book had appeared in that shape; but more than three years have now passed, and the temptation to add to these lectures as new information has arrived from time to time has been irresistible. These additions have naturally obscured the original outlines of the book. At first, however, it was the medical man to whom these chapters were addressed, and if they now help him in any way this must be accredited to the Medical Research Council, whose grant facilitated the giving of these lectures at the Maghull Military Hospital, near Liverpool, and to the encouragement of its late commanding officer, Dr. R. G. Rows.

In thanking those friends who have helped me, I wish to acknowledge first my great debt of gratitude to the late Dr. W. H. R. Rivers, the loss of whom to psychology is incalculable. He not only gave to the

manuscript his painstaking attention and the benefit of his wide knowledge, but discussed several parts of it at length with me. To Mr. R. H. Thouless, who has very kindly read the proofs; to Miss Evelyn Chorlton, who rendered me invaluable secretarial help during two years when pressure of other duties made book-writing very difficult; to my wife, who helped me considerably with the book in its early stages; and to Miss Mair Jones and Mr. L. B. Yates, who have prepared much of the typescript, I offer my best thanks.

I am indebted to the editor and the publishers of the "British Journal of Psychology" for their kind permission to reprint chapter viii., with its illustrative diagrams, and parts of chapters ix. and xii.; to the editor and the publishers of "Discovery" for a similar courtesy in regard to part of chapter v.; to the Manchester Literary and Philosophical Society, who have allowed me to reproduce from their "Memoirs" chapter xi. with diagrams; and to the University of London for permission to reproduce Plate III from Sir Francis Galton's "Inquiries into Human Faculty."

By the students of psychology who have been privileged to learn their subject from Dr. C. S. Myers the influence of his teaching upon this book will certainly be discernible. I wish to acknowledge here how much I owe to his friendship, help, and advice since the days when his lectures, convincing a student of the physical sciences that the problem of the observer is no less interesting than that of the observed, led me to the study of the mind.

T. H. P.

MANCHESTER
August, 1923

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INTRODUCTION

IN no sense is this a text-book upon the subject of memory. It has been written in the hope that it may serve as a guide-book to some of Memory's most interesting facts; helping the uninitiated to find their way through, and pointing out attractive items in a vast collection which has not yet been satisfactorily arranged or labelled. Like other guide-books, this one will not escape the criticism that the selection of its contents reflects too often the writer's own interests and prejudices, but frequent references to the work of others will enable the student to supplement or to correct the views expressed here.

The chapters in this book were drafted at different times between 1913 and 1921, though they have all been recently revised, and most of them have received considerable additions. They are not arranged in strict logical sequence; indeed, any appearance of completeness in a treatise upon such a vast subject would be illusory. Chapters i. to ix., however, are all closely connected, and may best be read in that order. Chapters x. to xiii. form an appendix illustrating many principles laid down in the main part of the book.

Though no special effort has been expended to

satisfy readers who spend their time in nothing else but to hear some new thing, they may find interesting matter. To many of them the old things presented here may appear new enough, for few references have been made to them recently in books intended for the general public. If there is anything new in the present book, I trust that it has not been focussed so sharply as to blur its context. I hope, too, that the manner of approaching psychological problems which characterizes these studies will not be taken as evidence of my disbelief in the value of other and very different methods.

During the last decade many writers with very different types of mentality, training, and experience have dealt with one aspect or another of the problem of Memory. No one book has yet attempted to extract the essences of this variegated bouquet. Such distillation will occupy psychologists for many years to come, and I have done no more than to assist in the preliminary warming of this vast alembic. The size and nature of this book necessitate the omission of many important matters, and mere allusory reference to others. There has been deliberate exclusion of any detailed description of certain parts of the field of memory already investigated by psychologists who have presented their results in untechnical language. For this reason, discussion of the laws of association, and of the economy and training of memory, and a full description of the different kinds of mental imagery have not been attempted here.

During the writing of this book the interest of the general reader has been kept in mind. Since two of its

starting points were attempts to help medical practitioners to link up normal psychology with psychoanalysis, and students of education to connect the discoveries of modern medical psychology with their own subject, it may introduce other readers with similar interests to new aspects of psychology. Some parts of it describe problems which may appeal to the athlete, the mathematician, the musician, and the writer. But if usefulness be discoverable in these chapters, like the cheerfulness of that famous young man who tried to be a philosopher, it would keep creeping in.

REMEMBERING AND FORGETTING

CHAPTER I

WHAT IS MEMORY?

PROGRESS in any field of thought is dependent in no small degree upon the use of terms which convey a precise and clearly focussed meaning. Many sciences long ago realized this truth, but psychology is still in the process of emerging slowly and painfully from the clotted condition which at one time characterized the others. In many branches of study the employment of the slippery words of popular speech, with an inevitable *obbligato* of apologies, has long been abandoned. Since no such step has yet been taken in psychology it is necessary when using any particular word to indicate the directions along which its usual meaning has contracted or expanded.

This shift of meaning usually operates economically, for words which popularly designate mental processes nearly always mean so much that they mean almost nothing. Of such words *memory* is a perfect example.

The psychologist has found the word memory to be practically most serviceable when it means the recall of past experience. The *sine qua non* of memory is recall. In this sense of the word, retained experience,

unless it is actually being recalled, is not strictly termed memory. This limitation of meaning necessitates the use of other words to describe factors, which, though essential to the occurrence of memory, are distinguishable from it. They are *impression* and *retention.* But, before their description is attempted, the reader is asked to permit a brief digression on the subject of analogies.

There are several ways of learning to swim. One is to be taught properly by an expert. Another is to be thrown into the water, and eventually to emerge or not, as fortune decrees, panting, scared, and discouraged for any second attempt. The last way is that of "little wanton boys who swim on bladders."

Now of these three methods, as they apply to the process of learning to swim, little need be said. The advantages of the first over the others are too obvious for ink to be wasted in their description. The second may produce a swimmer occasionally; it will drown a few and sicken many. The third will help a man at a precarious stage of his career; though at the price of a wrong position in the water. Yet a slightly tilted position on the surface is to be preferred to an indubitably horizontal but permanent one on the bottom. And a little moral courage will enable the beginner, as soon as he can swim a little, to throw away his supports and get down to real business.

Perhaps in the swimming world these views are heresy; even so, they appear to be reasonable. They seem at any rate to apply to the learning of psychology. Not a few persons have found the results of their first plunge into this subject so depressing that they have decided ever after to spend their intellectual life in some solider medium. Yet they might have been led to feel a little more at home in the new element if in the first

moments of floundering they had been able to lean on an analogy. They might thereby temporarily have learnt a bad style, yet habits which are but newly acquired are not hard to break. Therefore, with every warning which a swimming instructor would give concerning the bad effects of too much reliance upon water-wings, and with the serious exhortation to throw it away when it has achieved its temporary purpose, I venture to present the following analogy.

The different processes of impression, retention, and recall may be illustrated if the function of memory be compared with that of the gramophone. Sounds which this instrument is desired to reproduce are collected by a trumpet and directed upon a delicate recording membrane, causing it to vibrate. To this membrane is attached a sharp cutting point which is held in contact with a revolving disc of soft wax. As the membrane moves, furrows of greater or less depth are thus cut in the disc by the needle. This registration of the sounds may be considered as analogous to the process of impressing an experience on the mind.

In order for the sounds to be perfectly registered, it is necessary to have a membrane which will follow the slightest movement of the air, a hard and sharp cutting point, and a suitable quality of wax. For a memory to be strongly impressed upon the mind the most favourable conditions are the presence of perfect organs of sense, which may be compared to the trumpet and the vibrating membrane, attention sharply focussed, comparable to the sharpness of the cutting point, and a condition of the nervous substance so that it will retain the traces made upon it as the wax retains the furrows. The nature of such neural conditions is almost completely unknown to us, and such conceptions as brain traces are purely figurative. Yet it is known that

different states of the brain substance exercise an influence upon the impression of experiences. Intoxication and certain other conditions produced by disease may decrease enormously the fidelity of impression. It is generally believed too that youth favours the impression of vivid memories, while senility is inimical to such registration.

It is obvious that the material of the gramophone record must be such that it shall withstand the attacks of climatic and similar conditions, and that the tiny salient points of the furrows shall retain their characteristic outlines. It is highly probable too, that one of the chief factors determining the retention of past experience is the permanence of configuration of the structure of the brain and nervous system.

If the material of the wax cylinder be supposed to possess the property of holding, for a few minutes only, the conformation which has been impressed upon it, while after this time the wax sinks back into relative shapelessness, we have an example of impression without retention. An analogical condition exists in the mental realm, and is called loss of immediate memory. In Korsakow's disease, an organic brain disorder due to alcoholism, the patient loses the capacity to retain any recent experiences for more than a very short time, though events long past can still be recalled. In diseases such as general paralysis of the insane defects of memory are also attributable to organic causes.

To destroy the gramophone record obviously annihilates any possibility of reproducing the melody, but to crack it across may or may not interfere with complete reproduction; the impairment of the record's playing properties depending upon the width of the crack and the jumping power of the recording point. Is there in

the realm of mind any analogy to this condition? The answer is, undoubtedly, yes. For if some kind fairy, mercifully waving her wand over one little English word, would detach from it all those unfortunate implications which it has acquired in popular speech, the adjective "cracked" would fit like a glove those wonderful curiosities of memory which range from the almost incredible phenomena of dissociated personality to those normal pieces of mental apparatus known as "logic-tight compartments."[1]

Recall by means of the gramophone is achieved by guiding the point of a needle to which a reproducing membrane is attached, into the hills and valleys of the furrows in the moving record. Perfection of reproduction therefore will be closely correlated with the sharpness and hardness of the needle, the absence of scratches —i.e. of unwanted furrows—on the record; the integrity of the revolving disc and the reproducing membrane's capacity for delicate vibration. All these material conditions have parallels in the process of mental reproduction. Sometimes, although quite confident that we have retained certain experiences, we cannot, so to speak, put our hand on the record we require. At other times the needle seems to be so blunt that it skips over the tiniest crevices at the bottom of the furrows, refusing to reproduce just those delicately intimate details which make that particular moment worth remembering at all. Again, the record seems occasionally to have been abused in our absence, by some one unknown, scratched across so that the needle, deserting its usual path for new ones, perpetrates amusing, amazing, or alarming novelties. There are moments, too, when one's mind seems to be specially sensitized for the reproduction of some particular

[1] Cf. Bernard Hart, "The Psychology of Insanity." Cambridge.

memory. Some chance stimulus—for many people smells especially have this power—will call up a vivid recollection which we thought we had forgotten, and for the next hour our mind will hark back again and again to this long-mislaid experience. But this event, common enough in everyday life, is probably only faintly comparable to the extraordinary sensitivity possible under hypnosis, where the most minute details of a situation may be impressed and reproduced with the greatest ease.

But there is one possibility, which, fortunately, is seldom realized for the owner of a gramophone; that two tunes have been impressed on the same record. In the case of memory, however, this possibility becomes a probability, for it seldom happens that any event is retained and subsequently reproduced without bearing traces of its contamination with elements from other experiences which in some respects resemble it. The mental tune—to speak in terms of our example—which is played when we recall an experience is usually a combination of several melodies, the coalition of which has come about not by mere chance, but through the workings of definite laws of association.

But, some may ask, just as the destruction of the gramophone record puts an end to any further chance of hearing its tune, does complete disintegration of the brain necessitate a similar breaking-up of memory? No means exist of supplying an answer in the world of natural science, for we have strained our analogy so far that it has snapped.

To summarize the foregoing pages, the word memory, as used in popular speech, may mean impression, retention or recall, separately or collectively. But to the psychologist memory is the act of recall. Just as no gramophone yet made can reproduce sound perfectly,

so no memory has yet been found to recall an experience with absolute fidelity. Just as, when wishing the instrument to give a softened, though less detailed impression of the symphony, we attach to the recorder a soft fibre needle instead of the sharp and hard steel point, so we may think of the mental mechanism of recall as usually made of fibre rather than of steel. Our recollections are seldom really, that is, absolutely, intense and vivid; if they were they would defeat their own object, for their possessor would be unaware that they were memories, and would, in consequence, experience hallucination. Difficult as it is to account for hallucination, it is perhaps just as hard to explain why we do not suffer from them every time we remember anything.

What is a good memory? At such an early stage of the discussion, one cannot hope to give a satisfactory reply to this question, and the following pages are intended to do no more than to indicate some of the chief considerations which would govern the framing of a more complete answer. The whole of the rest of this book is an attempt to discuss these considerations.[1]

To say of a man that he has a good memory may convey a number of different meanings. Possibly, first of all, that his power of impression is good, that shortly after an event he can give a very vivid, detailed, and accurate account of it. This power apparently may exist either with or without a well-marked capacity for subsequently retaining such an experience. Recently, experimental investigation of these performances has

[1] A good summary of the results of work up to 1913 is given in G. M. Whipple's "Manual of Mental and Physical Tests." Baltimore, Part II, chapter viii.

been vigorously pursued, and the psychology of "testimony" would demand a whole book for its adequate description. From it very interesting results may be culled. We learn that it is much more difficult than is usually supposed to tell the whole truth and nothing but the truth, even if one wishes to. Furthermore, the difference between the fidelity of the spontaneously given report or "narrative," and that extracted under cross-examination, the "interrogatory," proves to be so great, even in the best brought-up persons and when the catechism is conducted by nobody more forbidding than the laboratory psychologist or the teacher, as to commend the experimental study of testimony to every one interested in legal proceedings. For if, under the calm physical and mental influences of the laboratory or the schoolroom, such glaring slips of memory constantly occur, can we believe that the environment of the witness-box and the emotional tension accompanying cross-examination in a crowded court will be likely to reduce their number or gravity?

Detailed statistical examination of the "narrative" gives evidence of the value of such work. Through it, proof is afforded of the existence of important facts which, without such empirical investigation, would probably have been denied as often as they were asserted. A few examples may be given here. The ability of the average person to remember correctly the details of action seems in every investigation to be established as definitely as the striking unreliability on the question of colour; whether the witness be male or female. Fifty per cent (and the figure shows comparatively small deviations in different investigations) of the statements made about the colours of objects are wrong, except, of course, in the case of things the hue of which is constant, or generally predictable like that of a pillar-

box or a top-hat. An almost equal degree of inaccuracy characterizes the testimony concerning the numbers of people or objects seen; a matter of some interest to the historian, who seldom enjoys even this privilege of dealing with testimony given a day or less after the event.

The degree of assurance of witnesses concerning different items in their reports, indicated by an interesting system of marking, is a subject which cannot be discussed in detail here, but which is of obvious importance among the criteria of a good memory. For a witness who cannot trust his memories might be better off, *qua* witness, without them.

As will be seen when the "apparatus" of memory is discussed, the unequal distribution of different powers of mental imagery amongst individuals causes their memories of a complex experience to differ from each other to an extent almost unbelievable to a person encountering this subject for the first time. On returning from an opera performance the present writer can give a detailed account of scenery, faces, action, lighting-effects, costumes, including even a faithful description of the tilt of the dress-tie of the first violin;[1] the only details missing being, unfortunately, every vestige of the sounds which he heard. For his world of memory is little more than a cinematograph theatre, and one, moreover, without an orchestra.

If by a good memory be meant that the power of retention is great, the difficulty at once arises that it is impossible to measure this retention except in terms of

[1] Even now my memory of an almost perfect performance of Mr. John Masefield's "Nan" is spoiled by the vivid flash of diamonds in a ring which the poor and unbetrothed village girl was wearing on the third finger of her left hand. For me the presence of that ring contradicted, and still contradicts, the whole story.

recall. It is conceivable that the study of retention is a matter for the physiologist, but to this subject, uncomfortably full of matters for controversy, we shall return in Chapter IX.

It is obvious that the possession of a really good memory will usually be interpreted as implying the power of prompt recall. Whether we must include the capacity for rapid learning is perhaps a little less certain. Yet the phrases "Slow but sure" and "Quickly come, quickly go" in their application to the subject of learning, carried more weight in the pre-experimental days of psychology than they do now. Probably the motive which prompts a belief in the regular coupling of defects with compensatory virtues has many ramifications in popular psychology. Yet experiment upon memory has made it clear that, whatever the relation between rapidity of learning and permanence of retention may be, it is certainly not simple and inverse. Some of the talents which make it easy for a person to learn quickly also contribute to subsequent ease and precision of recall. In this case, as in so many others, the sentence which most nearly expresses the truth is "To him that hath shall be given."

There is no doubt that, other things being equal, a considerable degree of credit should be attached in practical affairs to the power of prompt recall. Every examiner knows that a written answer, say, to question 1, may be impossible to a candidate when he first sees his paper, but that while he is tackling 2 and 4 their subject-matter may push up into his consciousness the materials for answering the first question. Without such adventitious aid he might have failed completely, and so in the interests of fairness the supplementation of the written examination by the *viva* is usually desirable.

The psychologists who framed the American Army's mental tests for recruits deliberately set more problems than even first-class men could do in the time allowed. For although, even for the very intelligent, solving a problem is often a slow process, by the efficient mind most of the time is occupied in that elaboration of memories called thinking, rather than in their mere emergence into consciousness. The possessor of a quick memory resembles the modern business organizer with a perfect filing system ; the minimum amount of time is wasted by both in collecting material. The supposition that either quick learning or prompt recall must inevitably be paid for by a lack of " depth " betrays an inability to distinguish between the raw material of thought and the finished article, and is probably dictated by sentimental factors.

Must a good memory be full and detailed? The answer depends upon the purpose for which the recalled matter is needed. The thought of Miss Bates in Jane Austen's " Emma " (Miss Bates has now been fittingly given a permanent emeritus appointment on the teaching staff of most psychology departments), and of Mrs. Nickleby deters us from encouraging any reader to try to fill his memory. With the *embarras de richesse* of these ladies in mind, one might be tempted to dismiss the matter by the remark that just as the possession of wealth without the capacity for its management may be a doubtful blessing, a bulgingly full memory, unless kept under proper control, is likely to prove awkward both for its owner and for his acquaintances.

But a propensity to accept unquestioningly the fact or even the name of control scarcely characterizes the twentieth-century thinker. He would immediately inquire whether the control of memories, like other examples of control, is not a problem in itself ; whether

like the others, this particular pattern of control may not occasionally be a disadvantage to its possessor. But to such an innocent question almost all the other questions worth answering in the biological world of to-day are attached by very short threads, and one fears to begin the attempt to answer the first, lest the others should be pulled about one's ears.

We may venture, however, upon the platitudinous statement that originality in thought must be connected with the freedom from the particular pattern of directive tendencies (to use a technical phrase) which characterizes the majority of people. And in this connexion it is interesting to note that in 1823 there appeared a book by L. Börne, modestly entitled "How to Become an Original Writer in Three Days' Time," which contained the following advice: "Write down, for three whole days together, everything as it comes into your head . . . that is the way to become an original writer."[1]

Whether Professor Freud was influenced by this suggestion when he developed the now famous technique and interpretation of "free-association"[2] is an interesting speculation. At any rate the word "control," together with Freud's equivalent for it, "censorship," are now regarded as signposts indicating the road to a host of unsolved problems.

To resume our original theme, a good memory should obviously be exact. An experience should be recalled without the loss of any characteristic details, and—which is just as important—without the gain of any foreign ones. Probably few persons realize how common is the latter event. In recounting a funny experience

[1] Mentioned by Mrs. Joan Rivière in a summary of the "Internationale Zeitschrift für Psycho-analyse," 1920, Part I; ("British Journal of Psychology" (Medical Section), 1920, I, 92).

[2] Cf. p. 79 f.

which has happened to themselves most people are apt not only to drop the unamusing details but to trim the edges of the focal events so that they dovetail perfectly into each other.

Since complete recall of any experience is impossible, a good memory should be serviceably selective. To good remembering, as to good art, leaving out the right things is indispensable. The art of forgetting is but the inner aspect of the art of remembering.

CHAPTER II

THE APPARATUS OF REMEMBERING

Structural and Functional Descriptions of Remembering

THE aim of this chapter is to give some description of the mental apparatus by means of which we remember. No attempt will be made to describe in their totality the succession of *processes* which constitute remembering, and thus fully to answer the difficult question, "How do we remember?" Contributions towards such an answer will appear throughout the book; but a separate volume, and that a very large one, would be necessary to contain an adequate description of memory in its functional aspect.

The scope of this chapter will be limited in another direction. It will not describe or discuss all the different kinds of mental imagery. The reader will be referred to several books which describe certain classes of imagery at length; the following few pages being intended to serve as an introduction to the beginner and to prepare for the reception of the ideas contained in the next chapters.

In order to describe the apparatus by means of which a past experience is recalled, we turn our observation not, as is usual, upon the things of the outside world, but upon objects, resembling them in some ways, though in other respects strikingly different from them,

the occurrence of which we attribute to ourselves. This process of looking inwards is called introspection.

Now when naïve untrained introspection is brought to bear upon memory-experiences which are more than, say, five minutes old, certain contents stand out in the foreground and are easily detectable. They are usually called memory images.

But they are by no means the only constituents of a remembered experience. As Professor Külpe said, they are more robust than some of their concomitant contents, and so it comes about that when we glance hastily at our memory-consciousness, they are the first things on which we lay our hands.

In chapter iv on "The Functions of the Image" the inadequacy of the assumption that images constitute the whole of our remembering apparatus will be demonstrated. Our account of the memory apparatus would be very fragmentary, however, if mention were omitted of two classes of mental phenomena in many ways closely related to images proper; the *after-sensations* and the *primary memory-images.*

After-sensations. — The after-sensations of sight are familiar to all. Every one knows that momentary excitation of the eye often produces effects which are easily noticeable for some time after the cessation of the original stimulus. Without such effects the firework display would be a feeble exhibition of moving coloured lights; the dazzling head-lamps of the motorist would lose most of their sinister menace, and the very existence of the theatre would never have been threatened by the cinematograph. But these examples illustrate only one kind of after-sensation; that which is called positive, because it reproduces the characteristics of the original stimulus. A less obvious kind—though once one has been introduced to it in the laboratory or through the

advertisement columns of the magazines, it is noticed often enough—is the negative after-sensation, which displays the antagonistic colour and brightness of the original stimulus. Thus if a student spends some hours in answering a vivid yellow examination paper, the white sheet on which he is writing is likely to appear bluish ; if one stares long at a red illuminated electric bulb, on switching it off it will appear again in the darkness after a few seconds, but now as a bluish-green.

Later research has made it probable that the terms positive and negative are applied merely to the two most obtrusive members of a long procession of after-sensations, every one of which can be noticed under suitable circumstances.[1] The condition necessary for producing an easily noticeable positive visual after-sensation is brief but intense illumination, as when, having accidentally glanced at the sun, one looks away towards a darker background. To produce negative after-sensations under ordinary conditions a longer fixation is usually necessary, though as Professor McDougall[2] has shown, the characteristics of all these phenomena are dependent upon a very large number of factors, such as—to take only one example—the background against which they are seen.

The above remarks have been confined to after-sensations of sight, though they certainly occur in some of the other senses. There is no doubt that they can be reckoned among the phenomena of cutaneous sensation. After-sensations of touch and of cold are often intense

[1] Cf. W. McDougall, "The Sensations Excited by a Single Momentary Stimulation of the Eye," "British Journal of Psychology," 1904-5, I, 78-113.

[2] Loc. cit., and "Some New Observations in Support of Thomas Young's Theory of Light—and Colour Vision," "Mind," 1901, N.S., x. 52 f.

and last for a long time. That there are after-sensations of hearing is undoubtedly true, but they are of very short duration. If it were not so, many of our most exquisite musical experiences would be impossible.

Memory After-images or Primary Memory-images.—It should be noted that all the above experiences are *sensations*, in the sense of the term which is explained on page 30. They are distinguishable from images. Yet a stage of transition between them seems to be occupied by the memory after-image, or primary memory-image, as it is sometimes called.

Let the reader ask a friend to uncover, for one second, under a medium intensity of illumination, some previously unseen and fairly complex object, such as a cigarette case, open and displaying its contents. As soon as it is covered again, let him observe the immediate impression which it has left behind. Though in some respects this memory after-image resembles the positive after-sensation the two phenomena can be easily distinguished. The latter is seldom seen unless it has been caused by a brightly illuminated object, while the former is noticeable if the object has been seen at all. The latter fades instantaneously; the former slowly. If the original object was tri-dimensional the memory after-image will represent it tri-dimensionally: its after-sensation, whether positive or negative, will be flat. While after-sensations follow the movements of the eyes, memory after-images appear to be independent of them.[1]

Professor Margaret F. Washburn has recently maintained that one of the most important distinctions

[1] Cf. M. F. Washburn, "Movement and Mental Imagery." New York, 1916, pp. 62 f.; C. S. Myers, "Text-book of Experimental Psychology." Cambridge, pp. 139-40.

between after-sensation, memory after-image, and revived image lies in their relation to attention. Her view is that, in the order of the last sentence, they "form an ascending series with reference to their dependence upon attention for their details."

It is clear that details appear in the after-sensations of sight whether they were attended to in the stimulating object or not. This is a fact generally known by all those who have worked with after-sensations, and it constitutes a technical difficulty in the investigation of attention by means of the tachistoscope; an apparatus which exposes pictures for very short periods, like $\frac{1}{60}$ second.

The revived image, on the other hand, that which occurs after an interval of time has elapsed since the original stimulation, Washburn believes to contain only what was attended to in the original. The memory after-image seems to resemble the revived image in so far that the elements in the original object to which most attention was given are usually those [1] which predominate in the image. It is, however, like the after-sensation in that it may contain elements which were unattended to in the original.

This latter fact is clearly shown in the auditory memory after-image. Many of us have the bad habit of saying, genuinely and in good faith, "I beg your pardon" when a question has been addressed to us, and immediately afterwards apprehending its meaning and answering it, before it can be repeated. Washburn says:—

> The auditory memory after-image, as a matter of fact, is practically valuable just because it does regularly contain details that were unattended to in the original, or even, like

[1] Perhaps not always. This point seems obscure.

the retinal after-image, calls our attention to the fact that the original stimulation has occurred. This is evident in the case where a remark made to us goes unheeded while the sound waves are actually operating on the auditory pathways, and only its cortical after-effect is responsible for its being finally noticed. The necessity, from a practical point of view, of some such arrangement is obvious. An object seen can often be looked at a second time; the characters not apparent at the first glance can be apprehended at the second. But a sound is usually fleeting; it is gone beyond recall in a few seconds, and what we did not apprehend while it lasted we must be able to catch in the memory after-image, or we shall lose it for ever.

It is noteworthy that the memory after-image will not appear at all unless attention has been directed towards it beforehand. Unlike the after-sensation, it has no tendency to force itself upon attention.

Some Characteristics of Revived Images.—As we have already mentioned, the remarks in this chapter are intended simply to call the beginner's attention to some outstanding characteristics of imagery. They do not aim at being exhaustive, comprehensive, or even representative.

The "mind's eye" is a phrase the meaning of which, to all except the congenitally blind, is understood immediately in terms of personal experience. But for psychologists the word "image" characterizes not only the experiences of the mind's eye, but also those recalled through the mind's ear, the mind's muscles, the mind's nose; in short, through any one of the numerous sense-organs dotted about the body, both inside and out. Possibly there exist as many kinds of imagery as of sensation, though the mind's eye has received by far the most attention. Indeed, it has been suggested that the earlier English philosophers in their descriptions of mental processes, gave undue predominance to

the rôle of visual imagery, because they themselves were vivid visualizers.[1]

The beginner in psychology, therefore, must accustom himself to the application of the term image to hearing, taste, and smell, in fact to all the spheres of sense, the number which far exceeds the five of ancient tradition. He will soon find that revived experiences from some of these spheres are only briefly described in textbooks of psychology. For example, one of the most neglected —and perhaps one of the most important—groups of imagery is referable to sensations from the skin, the subcutaneous tissue and the muscles, joints and tendons; a gigantic collection of diverse experiences which are usually smothered under the ambiguous word *touch*.[2] There are, moreover, images, or revivals, of experiences from the inner organs, particularly from those of sex, nutrition, and excretion; and it is obvious to every one that they play a very important part in contributing to, if not actually providing, the emotional tone of memories.

The psychology of imagery is of particular interest, and of particular difficulty, to the beginner, for it is here that he usually catches his first really vivid glimpse of the very significant differences which may exist in the mental apparatus of his various acquaintances. It is a commonplace of psychological observation that persons who possess a strongly predominant type of imagery not only take their mental equipment for granted, but usually find great difficulty in believing that any sane human being could live with any other kind of mental outfit. This mutual intolerance of

[1] Cf. E. B. Titchener, "Experimental Psychology of the Thought Processes." New York, 1909, pp. 211-13.

[2] Since this was written, a detailed study of this problem has been published by Miss Alice H. Sullivan, "An Experimental Study of Kinæsthetic Imagery," "American Journal of Psychology," xxxii., 1921, pp. 54-80.

people with different mental make-up is a theme which deserves a special section to itself.[1]

Varieties of Mental Imagery.—It is impossible to give here any adequate description of the chief characteristics of different kinds of imagery. Fortunately, it is also unnecessary, for the reader needs only to turn to one of the first treatments of this subject—the "Inquiries into Human Faculty" of Sir Francis Galton, to find a mine of information presented with inimitable clarity and charm. In recent years Professors E. Meumann[2] and G. E. Müller,[3] Dr. Mabel R. Fernald[4] and others have amplified the pioneer investigations of Charcot, Ballet, Fechner and Galton. All that is needed for our present purpose is to illustrate some of the chief differences between images from the various spheres of sense.

The general statement may be made that it seems probable that every such sense-sphere (or, to use the technical term, sense-modality) may give rise to imagery, that the experience of any sensation may be the basis of a subsequent arousal in the form of an image. This assertion, however, has not gone unchallenged in the case of so-called "motor" imagery, as we shall see later.[5] For the sake of brevity, only three outstanding classes of imagery; visual, auditory, and motor, will be discussed here.

Lack of space renders it impossible to enter here into

[1] See pp. 220-24.

[2] "The Psychology of Learning," English translation by J. W. Baird. London, 1913. See especially pp. 169-230.

[3] "Fur Analyse der Gedächtnistätigkeit und des Vorstellungsverlaufes." Leipzig, 1913. Both these works give extensive bibliographies. See also W. Stern, "Die Differentielle Psychologie," 1911, pp. 193 f.

[4] "The Diagnosis of Mental Imagery," "Psychological Review Monograph Supplements," No. 58.

[5] Cf. pp. 26-7.

details of the ways in which imagery may be tested. The most comprehensive description available is probably that of Dr. Mabel Fernald, who gives a succinct account of the work of her predecessors. Several points of general interest, well brought out in her monograph, may be mentioned here.

It is necessary to distinguish between the kind of imagery which a person habitually uses and that which he is capable of evoking if he makes a special attempt to do so. The first class is sometimes termed *spontaneous*, the second *voluntary* imagery. It is obviously desirable to investigate both kinds, as the second may be used at any time when for special reasons a particular memory has to be carefully examined, e.g. in trying to remember the colours of a dress or the notes in a complex musical composition.

The earlier descriptions of persons as exhibiting certain "types" of imagery, and the names, visile, audile, motile, etc., which were given to them, temporarily fostered the belief that the predominant sense-region was implicated in every aspect of the imaging-activity of the mind. It was even proposed that school children should be divided into classes according to their "image-type"! But it was soon found that a subject who habitually visualized intensely certain classes of remembered experience, e.g. concrete objects, or the actors and scenery of his dreams or phantasies, might not visualize words when he was thinking of them, but might employ for this purpose auditory or speech-motor imagery, or both. This specialization of the type-region may go still further. Even among the word-images we may find that a certain type is not used uniformly in all performances involving remembered words, but that its employment depends to a great extent upon the nature of the problem and its difficulty.

To say simply, however, as some have done, that the average person's imagery-equipment is "mixed" may imply a minimization of the important differences which do exist between persons. It is usual for an individual to possess one sense-sphere the imagery of which is predominant over that from the others. But the concept of predominance requires still further definition, for, in any one person the visual imagery, for example, may predominate over the other types by reason of its vividness, its profuseness, its readiness, its accuracy or its ability to carry meaning. Perhaps, too, the characteristics according to which we rate any imagery, are, to some extent, independent variables.

Almost every one is able in some degree to visualize, but there are enormous differences in this capacity.

> The extreme case of visual endowment is frequently observed in individuals who have devoted themselves to the plastic and graphic arts. Dr. Wigan tells of a painter who habitually dismissed his model after half an hour's sitting, and then painted, from memory, as though the model were still before his eyes. He recalled to consciousness a picture of the model sitting upon the chair, varied the posture, the expression, and the colouring at will, and had the visual image as clearly before him as though the model were present. Similar incidents are reported of Peter von Laar and Henri Regnault. Anselm Feurbach relates in his "Testament" that before painting certain of his pictures he planned and executed them mentally, "to the last brush stroke." The visual memory may, again, be chiefly and one-sidedly a form memory or a colour memory; nor does it always exist in combination with a highly developed visual perception. In contrast with those individuals who possess a superior endowment of visual imagery, we find others in our psychological laboratories who have had a thorough and well-rounded mental training and yet are scarcely able to recall a single colour or visual form accurately.[1]

[1] Meumann, op. cit. pp. 196-97.

Meumann reminds us that just as we class colour-blind people by stating the colours which they cannot see, it might be psychologically useful to designate in a similar way persons whose imagery is one-sidedly developed. A representative of the pure auditory ideational type would thus be described as a "non-visual-motor." Though the general utility of classification on the principle of *lucus a non lucendo* seems problematical, there is little doubt that it might act as a salutary reminder to such persons if they were ever tempted to generalize concerning the experience of others.

It must not be supposed that any person exists who remembers in terms of one sense alone; who forms a pure example of a type. Yet the imagery of some modalities seems to dominate the memory and thinking of some persons to such an extent that one is tempted to retain the concept of an approximately pure type as a convenient working tool. Such predominance seems certainly possible in the case of visual and of motor imagery. On the other hand, the pure auditory type, if it exists, is very rare indeed. Meumann, among numerous persons whom he has requested to make the necessary observations, has found none who employ heard words exclusively in their process of thinking. Yet he says that "many individuals approximate this type in that mentally heard words predominate in their thinking and are accompanied by but faint motor images."[1]

Auditory imagery need not be accompanied by musical endowment. Yet it is often an important factor in absolute tone-memory; the ability to recognize and sometimes to reproduce vocally, a tone from a particular part of the musical scale. Although absolute tone-memory is often regarded as a rare gift, it is probably

[1] Op. cit. p. 208.

much commoner than is generally supposed, and is susceptible to training. It might be mentioned that the possession of a precisely similar capacity in the sphere of vision, the ability to "carry" a colour in one's eye, is seldom regarded as unusual. In the latter case one is often helped by the fact that the colour can be given a descriptive name; and the writer's own experience is that the number of shades of any particular colour which he can carry in memory depends almost entirely upon his knowledge of the names applied to them in science, art or commerce.

Absolute tone-memory illustrates an important fact in this sphere of psychology: careless observation may lead to the mistaking of one type of imagery for another. It is possible to "place" a sound in the musical scale, by the aid, not of auditory imagery alone, but of the muscular strains which are necessary to sing or to whistle it. Such muscular strains seem to be remembered or re-instated[1] absolutely, in the same way that a cricketer may recall the bodily adjustments necessary to bowl a particular variety of "breaking" or swerving ball. But "vocal-motor" imagery is not always recognized as such by its possessor, and probably not a few persons believe that they have well-developed auditory imagery, when in reality it is poor, its deficiencies being hidden by the effectiveness of the muscles of speech and song. It may interest the reader to discover whether he can hear in imagination any sounds which he cannot himself produce; e.g. a note well above his vocal register, or noises like thunder or the drone of the wires in an aeroplane, descending with its engine silent.

This tendency of motor imagery to be confused with

[1] Cf. pp. 26-7.

that from other spheres is possibly one of the reasons why, in recent years, relatively little attention has been paid to it. There are certainly other causes too; one of the most important being that here the distinction between image (revived experience) and sensation (actual experience) becomes very difficult to draw. It may be that when we image vividly any movement, such as that of clenching the fist, actual contractions of the corresponding muscles accompany such a memory.

It seems certain that if this imaging be long continued, such contractions will occur, for very soon there appear achings in the part concerned. It is therefore not impossible to believe the assertion that muscular experience is never imaged, but only reinstated. This, however, seems by no means self-evident, nor can it be said to have been conclusively demonstrated.

A recent discussion of this subject has been attempted by Professor Washburn,[1] who comes to the conclusion that all cases of so-called kinæsthetic[2] imagery are really cases of peripherally excited movement sensations resulting from the actual slight performance of movements. She refuses the criterion which, for Professor Titchener, suffices to distinguish kinæsthetic sensation from kinæsthetic imagery. The distinction, he says,

> . . . may be roughly phrased in the statement that actual movement always brings into play more muscles than are necessary, while ideal movement is confined to the precise group of muscles concerned. You will notice the difference at once—provided that you have kinæsthetic images—if you compare an actual nod of the head with the mental nod that signifies assent to an argument, or the actual frown and wrinkling of the forehead with the mental frown that signifies perplexity. The sensed nod and frown are coarse and rough in outline; the imaged nod and frown are cleanly and

[1] Op. cit. pp. 48 f.

[2] For explanation of this term, see p. 28.

delicately traced. I do not say, of course, that this is the sole difference between the two modes of experience. On the contrary, now that it has become clear, I seem to find that the kinæsthetic image and the kinæsthetic sensation differ in all essential respects precisely as image differs from visual sensation. But I think it is a dependable difference, and one that offers a good starting point for further analysis.[1]

Professor Washburn's opinion, on the other hand, is that this difference between the coarse, roughly outlined movement which brings into play more muscles than are necessary, and the clear-cut delicately traced movement that involves only a precise group of muscles, is the difference, not between remembered but not actually performed movement and movement that actually occurs in the muscles, but between slight, tentative muscular movements, and large, visible, fully, executed ones. She asks also why it is so difficult to distinguish between the movement-image and a slight actually performed movement.

The matter is so debatable that no final pronouncement upon it is possible.[2] Yet both sides agree upon the great importance in any complex act of remembrance, of the images (or sensations) of motor experience, or kinæsthesis.

Some Characteristics of Kinæsthesis.—Such experience[3] involves the activity, not only of the muscles but also of the joints and tendons. As is well known, when muscles contract, the sensory nerve endings in both the muscles and the tendons are excited. When parts of a limb move, the joints are stimulated. The sensations from these various organs fuse to form in consciousness a

[1] "Experimental Psychology of the Thought-Processes." New York, 1909, pp. 20-1.

[2] Cf. Sullivan, op. cit.

[3] A detailed account of the kinæsthetic senses is given by Titchener, op. cit. 160-82.

whole which introspection alone is almost powerless to analyse, but which partially breaks up in certain pathological conditions, allowing the respective rôles of these different factors to be studied separately. It is therefore completely inadequate to term such experience merely muscular, and the word *kinæsthesis* is used to designate the experience of movements of our own locomotor apparatus. For somewhat similar experience, when our body is at rest, we may employ the related term *statæsthesis.*

It seems unnecessary to remind psychologically-trained readers of the importance of distinguishing the subjective from the objective aspect of motor activity. Yet the difference is often forgotten. Evidently Professor Knight Dunlap considers it advisable to emphasize the necessity of remembering the distinction :—

> When I speak of "muscular sensation" I mean the *peculiar aspect of the actual muscle-contraction which is perceived by the owner of the muscle, and by him alone.*[1] The contraction has visible aspects, and tangible aspects, which may be perceived by several people: in addition it has this "kinæsthetic" aspect[2] which can be perceived by one person only.[3]

This reminder is timely, for our thinking runs a risk of being confused by the stress which is usually laid upon what motor activity would *look like* to an external observer rather than what it feels like to its initiator, and upon what it *does* to external objects rather than upon what it *is.* Its physiological aspects and its behaviour-effects are subjects for consideration quite distinguishable from its subjective or strictly psychological aspects.

[1] Italics mine.

[2] Not only the muscles, of course, possess this kinæsthetic aspect.

[3] "Psychobiology," 1920, II, i. pp. 33-4.

Throughout the whole of the book no further attempt will be made to discuss the question whether kinæsthetic images really exist, or if all so-called images of kinæsthesis are in fact actual, though faint sensations. For the sake of convenience, however, and for no other reason, the words "image" and "imagery" will be used in the ordinary way.

The importance of kinæsthetic imagery in the general mental life of the individual is so great that it will be considered in a separate chapter.[1]

[1] Chapter xii. in Appendix.

CHAPTER III

THE PERCEPT AND THE IMAGE

Introductory; The Relation of Sensation to Perception

A SENSATION has been described as a modification of consciousness due to a stimulus; a stimulus as a condition external to the nervous system and acting upon it.[1] The first point of interest here is that the sensation is a *modification* of consciousness. It is merely a change in the subject's experience, not something which drops into a previous nothingness. The distant light-house flash stabbing the pitch darkness; the squeak of a mouse breaking the stillness of an empty room; neither of these come where nothing was before. The point of light or of noise simply replaces in the field of consciousness experiences of sight or of hearing as positive as itself; darkness or silence. A man blind from birth does not live in a dark world nor he who is born deaf in a silent one. Darkness and silence are seen and heard; for their appreciation one must have eyes and ears. And so the lines on the disappearance of a barrel-organ

> And silence, like a poultice, came
> To heal the blows of sound

exemplify a significant psychological truth.

[1] Cf. G. F. Stout, "Manual of Psychology," 2nd edition, 1904, pp. 172 f.

The stimulus, we may remind the reader, was defined as a condition external to the nervous system. It is not necessarily external to the body. In fact, many stimuli arising inside the body are of vital importance to our well-being; among them figure prominently those of kinæsthesis and of the organic senses. The whole system of mechanisms subserving sensation caused by stimuli inside the body has been termed by Sir Charles Sherrington "proprio-ceptive," to distinguish it from the "extero-ceptive" system which mediates sensations arising from causes external to the body.

This definition of sensation as a modification of consciousness does not imply that it is invariably an object of contemplation for its experiencer. Indeed, the most important cognitive constituents of our experience are not sensations, but *things*. A few moments ago, I was successively aware of a pile of papers, sunlight on my writing, a pen, a table, trees and a privet hedge, birds, flowers and fruit on a curtain, a ticking clock, a child's shout from the garden, and my comfortable slippers. The paper is white with green lines and a red margin, the pen black, the curtain a cheerful riot of reds, pinks, greens, greys, yellows, and black, the clock and the child are emitting sounds of different pitches, the looseness of my slippers is producing a complex of temperature and pressure sensations. Before I began to analyse, I was not aware of these sensations, but of the paper, the pen, and the rest. I cannot subscribe to the doctrine that I first *interpreted* the sensations and then perceived the curtain. Our experience grows in just the other way. We perceive things first; only later do we analyse their appearances into sensations of red or bitter or pain. Even then, the ordinary man's everyday analysis is very perfunctory, as he will find if he gets down to serious work upon the senses in a laboratory,

or if fate makes him a tea-taster, tobacco-sorter, wool-judger or listener for submarine sounds. In fact, our introduction to sensation is as gradual though not as rapid as that of the newly enlisted private to the differences of rank in the Army. Anxious to salute the right person, but without expert help in the matter, he may begin by discriminating well-cut uniforms from baggy ones. This, however, may cause him to salute certain colonial privates and to pass by certain American officers. Next, possibly, he will use the diagonal strap of the Sam Browne belt as a safer *differentia*. After saluting a few warrant officers he may learn to look for the cuff. A few experiences with officers whose cuffs are plain will guide his glance finally to the one safe place, the shoulder strap. He has now carried his discrimination, analysis, and abstraction to the highest degree required of him in this connexion. In a similar way we arrive at the correct naming of sensations. One of my children spoke of "the grey shawl" and "the pink shawl" long before she could name colours. For her "grey shawl" was merely the name of a beloved rag which she was allowed to caress, while "pink shawl" designated one which was sacrosanct.

When pinks and greens, sweets and sours, middle C and its neighbour are experienced as distinct from the flower or fruit or instrument which causes them, the subject may be said to be aware of a sensation. In so far as an ache or a pain is felt apart from a tooth or a particular tissue, it is a sensation. But it is therefore clear that sensations are abstractions from the perceptions of everyday experience.

Percept and Image.—The awareness of a material object present to our senses is called perception, and the object so perceived a percept. In what way does the percept differ from the image?

The image is sometimes wrongly regarded as a revived sensation. That this is almost never the case should appear from the above discussion. Nearer the truth is the common belief that the image is a revived percept. But to say simply that the image, the awareness of something which is not present to our senses, is a revived percept, is to make an assertion which does not fit the facts. If, after going to an opera, I call up in my mind's eye the appearance of the stage, in my mind's ear the sounds of the overture, in my mind's nose, muscles, joints, and tendons the experience of sitting in a cramped position in a hot auditorium, I am said to be imaging. Yet a little reflection soon shows that, strictly speaking, the experience is not *revived.* For not only is the remembered experience almost invariably taken to be a memory (an obvious, but important fact which will be discussed later) but it is usually far from being a mere copy of the original. It will, of course, probably differ from the past experience in being less vivid, but a still more important point of distinction is its incompleteness.

When this illustration of the opera occurred to me, I happened to think of Rimsky-Korsakov's "Coq d'Or." Immediately there flew into my mind a picture of a stage-high fuchsia, whose colours gradually appeared and faded until it was supplanted by a small tulip in a pot. Now, since in the actual scenery of the opera, so far as I can remember, the fuchsia was on the left and the tulip towards the right of the stage, this can scarcely be claimed as a revival of the appearance of the scene. For I know that between these botanical specimens there were in reality a castle, a courtyard, the chief singers, and a large and gaily-coloured chorus.

The function of this selection of the details recalled is obvious; my memory of the opera is coloured—

literally and metaphorically—by my interest in its scenery, this interest being sufficiently strong temporarily to obliterate what to many people might seem the essential and pivotal factors in the original experience. And it is just this selective nature of memory, favouring and welcoming what it wants at the moment, pushing out what, at just that point of time, is irrelevant for it, which is seen at its simplest in the formation of the image. Not only, however, is the image the result of selection, but on examination it often shows unmistakable evidence of the type of filter through which it has passed. If we may borrow, though modifying it slightly, an illustration used by Professor R. S. Woodworth,[1] the process of imaging is like what we might suppose to happen if a resourceful person who has been sent out to photograph a landscape, discovering on his arrival at the point proposed that he had brought his camera but forgotten the plates, decides to trace with a pencil upon the camera's ground-glass screen the picture which he sees focussed there. While the number of things which he *might* see is clearly infinite, the number which he will actually draw is equally obviously limited. Certainly he will not bring away with him the kind of copy which a mere photograph would have furnished, for the parts of the landscape which he will include or ignore will be accepted or rejected according to the particular interest which is dominant in him at the time.

Let us suppose our recorder to be an artist. The one factory chimney spoiling the sky-line may be discreetly omitted, the blatant details of the cluster of modern villas in the foreground mercifully softened, the dim

[1] "A Revision of Imageless Thought," "Psychological Review," 1915, xxii. pp. 1-27.

colours and feathery outlines of the trees and the lake in the middle distance, painted in with loving care. Transform our friend into a military observer, and in his picture the factory chimney and villas will stand up starkly amidst an obscure welter of vegetation; turn him into a house-builder, and wood, lake, and chimney become so much flat backcloth upon which are ruthlessly outlined the windows and doors of the villas, even to their very catches and knockers. So it is with the image; our mind never photographs, it paints pictures. And those pictures, if interpreted with understanding, portray not only the external, impersonal objects which they profess to depict, but the personality too, of their owner, who is also their maker.

We conclude, therefore, that though an image may exhibit a great profusion of detail, it is probably never a copy of the original experience. Yet, it may be asked, how can this statement be reconciled with the numerous instances of hallucination, in which an image is unhesitatingly taken to be external reality? The answer is that the normal everyday discrimination which every one makes between imaging and perceiving is the result of the complex interaction of many causes, of which the above—selection, due to interest—is only one. The factors must now be discussed which, in healthy, waking life enable the adult[1] so easily and almost invariably to distinguish a percept from an image.

[1] As is well known, very young children do not make this distinction so easily; they may not only assert, apparently with complete conviction, that they see an object, but insist on fetching grown-up people to see it too. The last appearance, in 1919, of the fateful "Black Pig" in Ireland strikingly exemplified this truth.

A beginning may be made by considering the results of an experimental inquiry into the conditions under which a rather unusual error of judgment can be made, in that an actual percept is mistaken for an image.[1] The object of the experiments was "to attempt to produce in an observer the impression that he was imagining an object which really was being presented, gradually and with increasing definiteness, to his vision."[2]

> In the wall of a dark room separating it from a light grey-tinted room of considerably larger size, there was a window filled with a sheet of ground glass. Facing the glass, in the dark room, was a projection-lantern. The grey room was artificially lighted by incandescent lamps, the experimental conditions of illumination of which would allow the ground glass to appear just noticeably coloured, without there being any such glow or shine upon the glass as could suggest the presence of a source of light behind it. The least intensity of light from the lantern which would suffice to bring the particular colour just over the border-line of visibility was thus found.
>
> This flush of colour was then shaped into the representation of some object of perception by a set of black cloth-covered screens in which were cut the forms of certain familiar objects. The edges of the holes were softened in outline by layers of fine gauze which projected successively farther and farther into the holes. These screens could be silently shifted along a rigid cross line, in and out in order to replace a solid black screen. When this solid black screen was removed the coloured light shone through the reducing and diffusing media and the faintly coloured and hazily outlined form lay within the background of neutral grey.

[1] C. W. Perky, "An Experimental Study of Imagination," "American Journal of Psychology," 1910, xxi. pp. 422-52.

[2] Cf. pp. 428-33. For the sake of brevity and to render the description easier to the general reader, a few omissions and alterations of phraseology have been made. I think that the quotation is a fair account of the investigation.

The stimuli were presented in a definite order: a tomato (red), a book (blue), a banana (deep yellow), an orange (orange), a leaf (green), a lemon (light yellow). The apparatus required the services of three experimenters. One had charge of the lantern lights, coloured and ground glasses, coloured and colourless gelatines and tissues. A second ran the stimulus screens into place, gave them a very slight slow motion during their exposure (in imitation of the oscillations of a subjective image), and at a signal replaced them by the solid screen. A third sat in the light room with the observer, to give instructions, take down introspective reports, and signal to the experimenters in the dark room for the appearance or removal of a particular stimulus. The electrical signal apparatus was arranged on the floor under the desk at which this third experimenter sat; as the wires were concealed and the experimenter's hands were free, the connexion with the dark room was, unless mistakes of manipulation occurred, not suspected by any observer.

The experimenter who was in charge of the lantern had an exact table of the changes required to raise the colour-stimulus from a definitely "subliminal" (i.e. "below the threshold," or unnoticeable), to a moderately "supraliminal" (noticeable) value. When the signal for a particular stimulus was given, the colour-stimulus was exposed, step by step as the table prescribed, and in a tempo that had been standardized by practice. That the observer in reporting an image, really perceived the stimulus, at any rate in the great majority of cases, seems to us to be proved by the fact that in only one single instance, throughout the entire series of successful experiments, did an observer report an image before the stimulus was (1) perceptible by the co-operating experimenter, and (2) of such objective intensity that its perceptibility might be expected from the results of preliminary control experiments. It may of course be objected that this proof is not demonstrative; the experimenter may have been suggestible, and the position of the just noticeable intensity may vary considerably from observer to observer. At the end of the inquiry control observations were accordingly taken from several observers who were university graduates, and it was found (3) that, when the arrangement was explained to them, so that they were in the position of the co-operating experimenter in the actual experiments, they invariably recognized

the appearance of the stimulus at or before the point at which they had previously reported an image of imagination.

The result of this investigation was to prove "that a visual perception of distinctly supraliminal value, may, and under certain conditions does, pass—even with specially trained observers—for an image of imagination." A percept then, under appropriate though somewhat unusual conditions, may pass for an image.

We may now examine a much commoner occurrence; the mistaking of an image for a percept. Such phenomena are called hallucinations. Popular psychology, however, usually omits to make a distinction of great practical importance; that which exists between the hallucination proper, and the pseudo-hallucination.[1] The former is taken by the patient to be reality itself. To him the mental process probably "feels" in no way different from that of perception, and the imaged object produces in him the behaviour which would be appropriate if it really existed outside himself.

The pseudo-hallucination, on the other hand, is experienced as a purely subjective phenomenon, which is recognized to be the work of the individual's own mind. This is not to say that the subject feels that he has *voluntarily* produced it, for the contrary is usually true. However, this experience sometimes occurs, for the hallucinations which have been produced and studied experimentally by taking a form of the alkaloid mescalin [2] are

[1] The medical reader will be reminded of the clinical significance of this distinction. Of the many hallucinations suffered by soldiers, in the later stages at least of the mental and nervous disorders produced by the war, the majority were pseudo-hallucinations.

[2] The active principle of the "mescal button," *Anhalonium Lewinii*, a favourite narcotic among Mexican Indians. See A. Knauer and W. J. M. A. Maloney, "A Preliminary Note on the

reported as "though mainly of an objective character, partly and remotely under the influence of the will." For example, while watching an hallucinatory panorama of a dancer on the stage, one of the authors deliberately attempted to visualize a shoe.

> He repeated to himself all the separate parts of a shoe, and endeavoured by concentration to bring up an hallucinatory image of a shoe. The danseuse continued to dance undisturbed for some time, and then suddenly and unexpectedly there appeared a gigantic and misshapen shoe, seemingly moulded in plaster, and coloured green.

Possibly, however, such phenomena are not strictly comparable with the pseudo-hallucinations commonly met with in mental disorders, and the results of this investigation suggest strongly that the relation of image to hallucination may be much more complex than has hitherto been supposed. If this prove to be true the account of their differences, to be given below, must be considered as merely a first approximation to the facts.

It may assist the reader if the differences are presented in tabular form, contrasting the chief characteristics of the percept and the image respectively.

THE PERCEPT IS USUALLY DISTINGUISHED BY—	THE IMAGE IS USUALLY DISTINGUISHED BY—
1. Vividness, aggressiveness, "force and liveliness with which it strikes the mind." (Hume.)	1. Dimness.
2. Distinctness.	2. Indistinctness.

Psychic Action of Mescalin, with Special Reference to the Mechanism of Visual Hallucinations." "Journal of Nervous and Mental Diseases," 1913, xl. pp. 425-36.

3. Being confirmed and supported by its sensory context: "consentience." (Stout.[1])	3. Being contradicted by its sensory context.
4. Being felt as not proceeding from one's own subjective activity.[2]	4. Being felt as so proceeding.
5. Steady.	5. Fluctuating.
6. Related to one's motor activity.	6. Unrelated to one's motor activity.

Of the first criterion little need be said. The most sceptical person must admit that in the perception of a cluster of scarlet geraniums, of the blare of a trumpet, of an aching tooth there is a certain tang of reality which is extraordinarily persuasive. The object—to use an inelegant but useful modern phrase—"sets about" us. The image, on the other hand, is usually dim and lacking in this quality of aggressiveness, so that, in order to prolong the experience, we have to "set about" it.

It should not be difficult to distinguish introspectively between distinctness and intensity. In the case of vision this difference is obvious. An arc-light seen through a mist may be intense but indistinct; the enthusiastic vocal efforts of a person unfamiliar with the use of the telephone present the pained listener with a homologous auditory experience. Usually, however, the percept is much more distinct than the image; it stands out more clearly against its sensational background. Its edges (and possibly it is scarcely straining language to speak of the edges of a voice or of a pain) are harder than those of the typical image, the borders of which are usually not

[1] "Manual of Psychology," 3rd edition. London, 1913, p. 535.

[2] "What the stimulus does for us in perception, we have to do for ourselves in the case of free ideas."—Stout, op. cit. p. 545.

only blurred but shifting. An image seems perpetually to be threatening to grow on this side, to shrink on that, or to turn into something completely different.

The next criterion is possibly the most important of all; the percept is usually confirmed by its sensory context. When, for example, a man enjoys the experience of swimming in the sea on a summer morning, his visual perception of the waves, the sun, and the sky is supplemented by the evidence of the coldness of his skin, the strains in his body and limbs, the sound of the splashing water and the taste of the salt. Moreover, this evidence, like all convincing evidence, is cumulative, not in the sense that the facts are merely added together, but rather that they fit into each other perfectly and complementarily, fusing naturally to form an unanalysed perceptual whole, the subjective reality of which is immeasurably greater than that of its separate parts.

Compare this with the same man's experience a week later, when, sitting at his office desk on a sweltering afternoon, he imagines that he is back again in the water. Though his visual imagery may be comparatively vivid and distinct, the sight of his telephone, his typewriter and his letter-files, the roar of the traffic outside his window, the pressure of his city clothing, the temperature of his skin, the stuffy smell of his office, the complex sensations from his muscles, joints, and tendons all vote solidly against the reality of his imagery. And, like all adverse votes, their effect is twofold, in that not only are they not given in support of the reality of the swimming experience, but they are decisively recorded against it.

These adverse votes probably play an important part amongst those factors which bring about the subjectivity of the pseudo-hallucinatory experience. In a case studied in some detail by the writer, the patient, who

was troubled for days by a complex visual pseudo-hallucination (vivid and intense enough to blot out all actual objects in the part of the field of vision which it occupied) seldom experienced any tendency to behave as if the hallucinated objects were real. Once, however, he walked towards the pictured persons, and one day when the hallucination was very intense, he caught hold of my arm and held it, saying "You are there, aren't you?"

The relative steadiness of the percept, in comparison with the fluctuating character of the image has long interested psychologists. Professor James Ward says that the image, in spite of our efforts to keep it constant, "varies considerably in clearness and completeness, reminding one of nothing so much as of the illuminated devices, made of gas jets, common at *fêtes*, when the wind sweeps across them. . . . There is not this perpetual flow and flicker in what we perceive."[1] Professor Stout comments: "Dr. Ward perhaps goes too far in attributing this flow and flicker to all mental imagery. Statistical evidence elsewhere seems to show that some exceptionally gifted persons can maintain a visual image before their mental view without these fluctuations. But even in these cases the detention of the image costs a kind and degree of mental exertion which is not required in attending to percepts."[2]

Lastly, the percept is related to our motor activity in a way which is not characteristic of the image. When we see a table in front of us, its visual appearance varies continually with the angle from which we view it. If we turn our back upon it, it disappears from our

[1] Article on "Psychology," "Encyclopædia Britannica," 9th edition, xx. p. 58.

[2] "Manual of Psychology," 2nd edition, 1904, p. 427.

visual field. On the other hand, the image is seldom or never so fixed in space with relation to our movements, though there may be considerable individual differences in this respect, some persons being able to view their imaged object from any angle and at any distance, while others find this acrobatic feat quite impossible, or feasible only within narrow limits.

CHAPTER IV

THE FUNCTIONS OF THE IMAGE

IN the first two chapters of this book the memory-experience was described with a view rather to its structural make-up than to the functions of its constituent parts. The chapters might be called an account of the gross anatomy of memory. But the modern anatomist is seldom content with the mere description of bodily structures; he constantly desires to understand their functional relations both to each other and to the whole economy of the organism. Similarly, the psychologist no longer regards the description of imagery as a separate chapter in any general exposition, but believes that images can be adequately understood only in their relations to other mental factors. To describe some of these relations is the aim of this chapter.

The chief function of imagery seems to be the conveyance of a *meaning*. In chapters x., xi., and xii. will appear numerous examples of this vehicular function of the image. The meaning may be specific, like that of a lowered railway signal, or it may be general. For one person, a meaning so abstract as that of the values of negative numbers is carried by a visual image of steps descending into darkness; by Alexander Scriabin, the Russian composer, the key in which a musical passage was written was seen as a distinctive colour.[1]

[1] See pp. 182-84.

The meaning carried by any particular image may be very narrow or astonishingly wide. To a schoolboy whose acquaintance with algebra is still far from intimate, the sign $\sqrt{-1}$ will be almost meaningless; for a mathematician it may be the slender peg from which hangs the weight of a whole hour's musing.

Meaning, too, may be relatively stable or shifting. To the non-mathematical person the meaning of $\sqrt{-1}$ will alter little from day to day, but many an image which conveys one meaning to-day may have acquired quite a different one by to-morrow. My image of a red cloth tied to a stick may mean at different times such disparate things as "revolution," "ninth hole," or "road up."

Though it is more orthodox to write of the function of an image, it is not unfair in this connexion—indeed it is probably more correct—to use the word "job," if a job be defined, as it is in the first dictionary which lies to hand, as "a piece of work, more especially of a temporary nature." For many images seem constitutionally incapable of sticking to one kind of work, and some cheerfully perform functions even more numerous and heterogeneous than Bill the Lizard's in "Alice in Wonderland." This capacity for jobbing characterizes more particularly the images of geniuses, wits, and cranks.

The most steady workers in this department of the mind are the images of words, which will be discussed more fully in a later part of this chapter. The invention of a new word is usually dictated by a desire to tie down a meaning which hitherto has been unsatisfactorily expressed. But with the exception of such unusual instances of the use of words as those in Euclid's definitions, it is doubtful if this attempt is ever completely successful. And the reason for this, as Dr.

F. C. S. Schiller reminds us,[1] is that meaning is essentially progressive. The meaning of any object in my environment, as well as of any word in my vocabulary, grows with my use of it.

This is clearly visible in the manner in which new words introduce themselves to us in the course of conversation or reading. Diffidently or suspiciously we eye them, our fingers itching for the half-brick with which to greet them in a truly British manner; for weeks we refuse to know them, unless they have been properly introduced by personages high in the spheres of society, science, or art. Then for a long probationary period we air them; cautiously, if we are grown-ups, while our children, the real democrats, flaunt them in all kinds of company, finding their meaning in a *staccato* but persevering manner, as water on a hillside finds its level. In such a fashion new words worm or blast their way into our vocabulary. In time the editors of even the more dignified newspapers decide to employ them without the protective fence of apologetic inverted commas. After this they slide quietly into the dictionary, there to enjoy a relatively stable and placid existence until some bustling reviser of a later edition ejects them to be invested with new meanings which have agglomerated round them like the honorary degrees of a world-famous savant. As Dr. Schiller says:—

> That words have stable meanings demanding scientific recognition is sufficiently attested by the existence of dictionaries, which are catalogues of the meanings on record. At the same time the fact that dictionaries also grow antiquated proves that the meanings of words continue to grow in spite of them. Actually no word can have its meaning so fixed, whether by a dictionary or by a definition, that it cannot

[1] "The Meaning of Meaning," "Mind," 1921, xxix. N.S. No. 116.

work loose. So though the discoverers of new truths and the makers of new values often have reason to complain of the stubborn conservation of words, the corrupters of language, from the ignoramus to the humorist, triumph easily over the fixity of their meanings. An analogy, a metaphor, a sarcasm, a joke, or even a blunder, will easily do the trick.

Thus logicians might be invited to take note that "I don't think" has become an emphatic form of affirmation, and that in America to "hypothecate" means "to frame hypotheses" and no longer to "pawn," and so fills a lacuna in English.

The reader may find it an interesting psychological exercise to examine the meaning which he himself attaches to some new word which he has recently learnt, especially if the history of its development in his own experience can yet be traced.[1]

It is evident that, treated psychologically, Meaning cannot be regarded as impersonal, whatever other branches of study may make of it. This is pungently expressed in Dr. Schiller's essay :—

[1] Anyone who is attracted by this task may be recommended to define and to distinguish between the meanings of two words which, whether we liked it or not, recently took up their abode with us: "stunt" and "gadget." The way in which the writer first met with, and thought he had grasped the meaning of the latter word, is not without interest in this connexion. He heard it first, some years ago, from a friend interested in balloons, who remarked that a certain type possessed a number of unnecessary gadgets. At the time something prevented him from inquiring the exact meaning of the word. When asked a day or two later what a "gadget" was, he confidently replied, "A part of a balloon."

Perhaps this true story may help to authenticate that famous definition of an average as a thing that hens lay eggs on. Both are rivalled by the recent dictum of a very youthful son of a professor. A schoolfellow, asking the inconsiderate question "What *is* a professor?" received, and apparently was satisfied with the reply, "Oh, a man who messes about with Piltdown skulls and things."

> The view of Meaning I have advocated may be summed up in the phrase that *Meaning is essentially personal;* and so it must cause endless trouble to a logic or a psychology built on the assumption that it is *de rigueur* to abstract from personality. What anything means depends on *who* means it, when, where, why, on what occasion, in what context, with what purpose, with what success. A real meaning is as surely rooted in a definite spot in an individual soul as any flower in its bed. It is as particular as any fact can be, and cannot be transplanted to another situation without the risk of a fatal loss or change of meaning. Hence it is incumbent on every one who concerns himself with meaning to beware of stopping short at the conventional meaning of the words, and to press on to the meaning of the man who uses them. . . .
>
> It should be noted further that to declare that meaning is personal is to imply that it is relative to the *whole* personality, and is not a purely intellectual affair. It is deplorable, but true, that intellectual considerations count for very little in the total reactions of the great majority—even of those who believe themselves to be following the light of reason ; nor is any of the artificial simplifications to which the sciences initially have recourse more productive of confusion and contention than the facile assumption that when two persons *say* the same things they must also *mean* the same things. They usually *don't*, as appears when they make a real effort to understand each other. Hence it is the rule rather than the exception that the same "proposition" should have very different meanings in the context of two minds with different temperaments, histories, and prejudices, and vast masses of perfectly futile controversy would be cleared away if more attention were paid to the idiosyncrasies of the parties concerned and to the natural difficulties in the way of an effective communication of meaning.

The Idea.—Though an image may be regarded as a structural unit of memory, it is clear that if it is to become a functional unit it must be considered in connexion with its meaning, for an insignificant image, in the strict sense of the term, is unknown to us. The significant mental image; the image plus its meaning, is nowadays generally known as the *idea.*

Every image enters consciousness surrounded by a

halo of meaning. And that halo—if we may continue the figure—variable in colour, intensity, and the direction of its greatest breadth, expresses the image's past, present, and even its future functions and relations with other images. An image must be known by the company it keeps.

The Relative Independence of Image and Meaning.—One of the most interesting features of the modern development of psychology is the disappearance of reference to *states* of consciousness. The reason for this is a good one. Static is about the last adjective which we could honestly apply to our consciousness, which seems to be incessantly changing. We have seen that the conscious aspect of meaning is no exception to this statement. But when we write, as we so often do, that an image may appear at different times with entirely different meanings, are we not very near the assumption of a "permanently existing idea which makes its appearance before the footlights of consciousness at periodical intervals," which Professor William James flatly declared to be "as mythological an entity as the Jack of Spades."[1]

After this opinion was recorded, a host of facts discovered in psycho-pathology diminished its weight, if not, indeed, its comprehensibility. The present book is not a suitable diving-board from which to plunge into the metaphysical morass in which this vitally important problem lies. But the present writer cannot refrain from recording here his suspicion that the formula: "same image, different meanings" may have been arrived at without any very prolonged introspective examination of different types of mind.[2]

[1] "Principles of Psychology." London, 1901, i. p. 236.

[2] He had accepted this formula until his attention was drawn to its questionable nature by Dr. C. S. Myers.

The question is obviously a difficult one to settle even by expert introspection. But it can be stated quite clearly. Let us take a well-known lecture example; that the visual image of a dome may to-day mean St. Paul's Cathedral, to-morrow a mosque, and the next day the Mohammedan faith. It is important to discover whether on each of these three occasions the visual image, *qua* visual image, *is* the same, or whether *at the moment of its entrance into consciousness*, its appearance is actually influenced by the meaning which it is to represent. The writer cannot convince himself that his own visual image of a dome is not thus altered from the very beginning. It may float into consciousness vague, detached, and unconnected with any building beneath it. All the same, it seems to bring—unless a definite attempt be made to suppress it—the dimmest suggestion of the roofs of the shops in St. Paul's Churchyard. Whether that dim suggestion is carried by the lightest of visual smudges or whether it is *meaning*, he cannot decide.

An apparent example of the constancy of a visual image with changes of meaning is given by certain types of number-form, which will be described in chapter xi. Possibly it is upon this material that observations of this kind could best be carried out, as in many instances these forms are frequently employed by their possessors.

The converse of this, a relatively stable meaning being carried at different times by different images, is common. Such an experience would probably occur if a child asked one to explain a phrase like "the survival of the fittest," when one's mind, flashing back to the seas and the jungle, selects concrete examples which convey, as nearly as possible, the same meaning.

But in no realm of the mind's activity is the relative independence of image and meaning seen so clearly as in the dream. There it is the rule rather than the exception for the image, laying aside its customary functions, to engage in all kinds of amazingly unconventional activities. In one sense the dream is a carnival of the images; in it they wear the strangest trappings, consort with the most unusual companions, and are implicated in pranks which anyone who knows only their everyday behaviour, might scarcely believe to be possible. The dreamer who is supposed by his friends to be responsible for these madcaps usually feels no uneasiness at their strange behaviour, though immediately he ceases to dream and becomes again a normal citizen he naturally does his very best to disown them.

The loose connexion in dreams between image and meaning may be illustrated by the following examples; the first from the writer's collection, the second from Dr. F. Hacker's:—

> I dreamt I was back at school. An animal ran up the door and remained still, half-way up it. We all said "There's a rat," and began to throw things at it. As I awoke I saw clearly that it was a lizard. Its tail, head, and coloration were all correct, and I recognized it as an actual lizard which hangs on a wall, at that height, in a house in which I lived for several years. The image in the dream was undoubtedly that of a lizard, but the meaning both of its appearance and behaviour was that of a rat.

> A friend asked me to visit him and to go with him to the North Pole. I decided to do so. On being conscious of the North Pole I had an image of a picture, recently seen, which portrayed an ice-landscape. The consciousness of what the North Pole really is was absent; I thought rather that from the North Pole I should have to send picture postcards to some friends. Thus the meaning which I usually connect in

waking life with the words "North Pole" was absent, for I can scarcely abstract from the knowledge that the North Pole is a part of the earth which is extremely difficult to reach.[1]

The Selective Nature of Imaging. — Throughout this book it has been insisted that memory is always selective, that there can never be a complete revival of any past experience. Even if the imagery from any particular sense sphere, e.g. that of sight, be a faithful and complete representation of the object—and this is highly improbable—there is no likelihood that the accompaniments from the other sense-organs, the ear, the nose, the skin, and the muscles, which occurred in experience simultaneously with it will have been recalled at the same time. Their absence usually affords a conclusive proof to the subject that it is an image and not a percept which he is experiencing. This selective omission in all recall must be regarded as a fundamental fact, and the realization of its significance as one of the starting-points of the newer psychology.

Is the Apprehension of Meaning possible without Imagery? If the image be regarded as a carrier of meaning one cannot refrain from inquiring whether all meanings need such a vehicle. May a meaning, like a human being, eventually attain to such a state of independence that its perambulator, the image, becomes unnecessary and vanishes? Does a meaning ever become self-supporting? In other words, may the mind attain such a degree of development that meaning can be apprehended without the assistance of any imagery whatever?

Perhaps, though it seems unnecessary, it will be well to clear away a possible source of misunderstanding. The

[1] "Systematische Traumbeobachtungen mit besonderer Berücksichtigung der Gedanken," "Archiv für die gesammte Psychologie," 1911, xxi. p. 28.

difficult question, "Can we ever think or understand without percepts or images?" is sometimes complacently answered in this way; "Yes, for words may take their place." But very little thought will suffice to show that the words themselves are either images or percepts. For the words, in order to be apprehended at all, must be actually seen, heard, spoken, "touched" (as by the blind) or must appear in experience as images, however ephemeral. Anyone, therefore, who seeks an easy way out of this difficulty will find such an inviting emergency exit closed. Not a few psychologists nowadays maintain that awareness of meaning is possible in the absence of any discoverable kind of imagery, even the imagery of words.

The germs of this theory, as of so many developments in psychology, may be traced in Galton's description of imagery in the "Inquiries into Human Faculty." All through this account one finds sentences and phrases, which though, when they were written, they recorded little more than Galton's puzzlement, are to-day clearly recognizable as the beginnings of whole chapters in psychology. He writes of visualizers who complain of a lack of flexibility in their imagery, the very concreteness and rigidity of which bind them down to one narrow interpretation of a meaning, just like (as he might have written had those days not been less troubled by it) the pictorial election poster.

Again, he records how, when he sent out a *questionnaire* to distinguished scientists, certain eminent geometricians surprised him by declaring that they used no visual imagery, though he would have thought it indispensable for their work; while others, who had once possessed such imagery, testified to its atrophy in later life. These and other similar facts caused Galton to record his belief that under certain circumstances vivid

and clear imagery may be a hindrance to thought, especially if that thought be of an abstract nature.

Interesting supplementary evidence on this subject is afforded by Dr. W. H. R. Rivers's recent remark upon his own imagery:—[1]

> I am one of those persons whose normal waking life is almost wholly free from sensory imagery, either visual, auditory, tactile, or any other kind. Through the experience of dreams, of half-waking, half-sleeping state, and of slight delirium in fever, I am quite familiar with imagery, especially of a visual kind, which, so far as I can tell, corresponds with that of the normal experience of others. I am able to recognize also that in the fully waking state I have imagery of the same order, but in general it is so faint and fragmentary that the closest scrutiny is required for its detection. It is clear to me that if it were not for my special knowledge and interest I should be wholly ignorant of its existence. On looking back in my youth, I can remember the presence at that period of fairly vivid visual imagery in connexion with certain kinds of experience, especially of an emotional kind.

Investigation has shown that persons are not uncommon who, when thinking, seldom use any kind of concrete imagery, visual or other, but that it arises in consciousness when conflict, doubt, or hesitation occur during the attempt to solve a problem.[2] In such cases it usually appears as an attempted illustration of a general principle, but is often discarded eventually as irrelevant, inadequate or misleading.

Imageless awareness may perhaps represent a limiting case, when, the substantiality or opacity of the image becoming minimal, meaning dominates the experience to a maximal degree. And here we become painfully conscious of the comparative brevity and the

[1] "Instinct and the Unconscious." Cambridge, 1920, p. 11.

[2] Cf. C. Fox, "The Conditions which Arouse Mental Images in Thought," "British Journal of Psychology," 1913-14, vi. pp. 420-31.

elementary nature of the present book, for we are brought face to face with many intricate problems, none of which have yet been solved. We can do no more than to mention some of them here and perhaps to indicate the lines along which their solution is being attempted.

1. Does the image ever completely vanish, or does it merely become so unsubstantial as to defy discovery by untrained introspection?

2. What can we suppose to be the parts of the nervous system which are more particularly concerned with the apprehension of meaning, either with or without images, visual or other? What evidence can be obtained from physiology or pathology towards the solution of this problem?

3. May the simplest form of meaning be primitive and elementary, existing at the very dawn of mind? Is it possible to conceive any sensation—even that of the child at or before birth—as existing without *some* meaning?

4. What is meaning? Have objects a primary meaning or is all meaning secondary and derivative, resulting from a kind of chemical combination of sensations, images, and affections, which by themselves are incapable of giving rise to it?

As we have said, we can do no more than to indicate certain paths along which solutions of these problems may some day be found. Now, there is little doubt that visual imagery lends itself best both to casual introspection and to experimental investigation. Indeed, one often suspects even the most careful psychologists, when they deal with "sensory imagery," of occasionally thinking and writing not of imagery in general but of visual imagery. Therefore some light may be cast upon our problem by a consideration of

The Advantages and Disadvantages of Visual Imagery as

a Vehicle of Meaning. Let us attempt an estimate of the value of the habit of visualizing vividly and concretely. People who themselves visualize with difficulty are sometimes heard to express envy of the fortunate individual who "thinks in pictures." Beyond all doubt there are delights which the possessor of this power would never willingly surrender. But

> . . . that inward eye
> Which is the bliss of solitude

may be its torment too. And for those unpictorial thinkers to whom memories are vouchsafed from regions of the mind where sight was not the sole source of joy, there are unique compensations; "the roar of the ocean, the splash of the fountain," and—most glorious of all to those who can bring back its full significance—"the wind on the heath."

Quite apart, however, from the capacity for producing pleasure, which visualization possesses, must be discussed its value as an equipment for the practical dealings of everyday life.

The relation between thinking which is carried on by the aid of numerous vivid images of concrete objects and that which proceeds with the minimum of such pictorial illustrations—and those, moreover, merely schematic—may be compared to that which exists between a primitive system of barter and the modern method of conducting financial transactions by means of the cheque. The advantages of being able to pay for one's requirements in solid material goods are sufficiently obvious to need no description here. The disadvantages of barter; the difficulty of immediately obtaining possession of one's land or cattle; the probability that the prospective purchaser will not require, or will be unable to utilize the particular goods offered to him; the danger

that the delay thus caused may lose the chance of a good bargain; the waste of energy involved; all these contrast vividly with the ease of financial transactions which the cheque makes possible.

Like the thought which is accompanied by the minimum of imagery (or, perhaps by none at all) the cheque may appear small, dull, and unimpressive. Yet both are capable of carrying meanings or values of almost illimitable magnitude, which, moreover, are rapidly mobilizable.[1] Both are acceptable to another person whose mental or material banking account is of a nature which allows him to negotiate such a symbol of value. They share one obvious danger and disadvantage. For just as a cheque sometimes bears on its face an amount larger than its drawer's credit at the bank, the utterance of an impressive general statement only too often involves an overdraft upon a man's intellectual deposits. But discussion of the ethical aspect of both these transactions must be left to others.

It has been pointed out already that until recently, descriptions of remembering were confined to the structural aspect of the remembering apparatus. Although by now our knowledge concerning the different

[1] Galton writes, in the "Inquiries into Human Faculty": "There is a curious dictum of Napoleon I quoted in Hume's 'Precis of Modern Tactics,' p. 15, of which I can neither find the original authority nor do I fully understand the meaning. He is reported to have said that 'there are some who, from some physical or moral peculiarity of character, form a picture (*tableau*) of everything. No matter what knowledge, intellect, courage, or good qualities they may have, these men are unfit to command.'"—Everyman's Library edition, p. 78.

May it not be that the concreteness of the situation, as represented by such an image, unduly confines and narrows its meaning, so that a slightly different situation is less easily and quickly conceived by such means than by the use of words?

varieties of images is by no means small, comparatively little information about their functions is available at present. To the student of the history of thought this will not be surprising. In the biological sciences knowledge of structure is considerably in advance of that of function: many investigators, indeed, appear to be little interested in the latter.

So in psychology there are interesting and valuable descriptions of the appearances and nature of those concrete, material goods, the images; the basis of that simple barter which forms most of our mental transactions with other men. Descriptions of the part played by these images, however, are rarer. And though by now the existence of the mental cheque, the "imageless awareness,"[1] the unobtrusive yet comprehensive carrier of a vast meaning is generally admitted, there are few satisfactory descriptions of it. For this, one very good reason is that verbal clothes for the newcomer are hard to find. Its sponsors, *faute de mieux*, sometimes borrow them from the older, simpler analytic psychology. As a natural result a large area of the wearer lies bared to the icy winds of criticism, though the donors of the garments often urge that they cover him perfectly. Occasionally the wardrobe of logic is ransacked. Suits from this source appear to be ampler and to fit better, though in the eyes of many their own somewhat variegated past history seriously discounts the utility which they may possess. Yet though we still wait for satisfactory descriptions of imageless awarenesses there seems to be no doubt that such experiences are very common amongst persons who are accustomed to abstract thinking.

[1] Possibly it may be more correct to describe it as awareness with the minimum of imagery, though there is support for the view that imagery in such cases is undiscoverable.

And this inevitably suggests a question. Do not many people, including, perhaps, not a few of our educators, marvel uncomprehendingly at the power of a great mind to draw mental cheques in much the same way that the child admires the cleverness of his father who can perform similar feats at the bank? Vaguely to attribute these performances to genius or to heredity is usually merely an excuse for intellectual laziness, for in that sphere of intellect where success depends upon the ability to handle great general truths and principles, there is usually evidence that to the natural gifts of these geniuses there have been added the advantages of special training in such ways of thought. To express a belief in the possibility of learning to think is to imply that some day it may no longer be necessary to blunder into the way of thinking as a kind of accidental product of innumerable false starts, collisions, and rebuffs, but that from the beginning one may enjoy the advantages of a technique which has been evolved as a result of careful comparative investigation of the mental processes of successful thinkers.

It is at this point that we encounter one of the most difficult problems in our investigation; that of discovering the *psychological* (as distinguished from the logical or the metaphysical) nature of meaning. If the psychologist is to describe this entity he must deal with the subjective, inner experience of an individual when a material object, a perceptual situation, an isolated mental image, or a memory or thought experience in its totality "means" something to him.

The reader will see that if this discovery were completely successful it might put an end not only to the problem of meaning, but to psychology altogether, for every psychological investigation deals with some aspect of this question. It is not unnatural, therefore, not only

that different workers should have attacked the problem from different directions, but that in time some of them should have come to regard their own particular line of investigation less as a line than as an area, perhaps congruent with the whole field of psychological inquiry. In this book, however, we can only indicate certain sources from which, some day, the solution of this problem may come.

Let us begin by considering the meaning of a material object, actually present to the senses. Imagine a scientist entering his laboratory early some morning, thinking absorbedly of a problem far removed from the solid details of furniture and apparatus through which he begins to thread his way. Can we say that in his abstracted condition they mean *anything* to him? Obviously yes; though their meaning for him is vague and unfocussed, they control that part of his body which avoids them as he walks. Yet this meaning is by no means unimportant, as we should see if in his absence the laboratory had been denuded of its usual contents. Almost certainly the mental shock caused by the new sight would momentarily obliterate the problem over which he was browsing.

Now let us suppose that as his glance roves idly over the apparatus it encounters his desk-telephone. Suddenly he remembers yesterday's promise to ring up a friend as soon as he arrived at the laboratory. Immediately his experience suffers a sudden shift of accent; the thought of his problem nearly vanishes; and for the moment the telephone has an important meaning for him. Now, what is this meaning, in terms of his experience?

Let us imagine that though the sight of the telephone has jerked the man's mind back to the promise, he is still too interested in the subject of his musings to feel

any strong impulse to speak into the instrument or to manipulate it in any way whatever. We may still suppose, however, that although by now he is again occupied with the interesting problem, he is not quite free from an uneasy feeling that he ought to approach the instrument and unhook the receiver. Now it has been suggested that this second meaning of the telephone is carried by precisely the same kind of physiological and psychological apparatus as the first; that if a physiologist and a psychologist could get inside the man's skin and consciousness respectively, and could crawl about where they pleased, what they would observe in these two cases would differ rather in intensity of detail than in quality. The twinge of conscience, indicating that he ought to telephone, will be "carried" by minimal contractions of the same muscles[1] which, if they were allowed to contract fully, would execute the action. Moreover, so the theory runs, his eyes, his head, his trunk and his limbs would be the seat of those self-same muscular contractions which, if intensified, would have brought about the total behaviour which he had promised. In other words, doing a thing and intending to do it are different in that the first involves explicit muscular movements, the second movements which are implicit though none the less real.

Now a super-physiologist may be conceived who, by the aid of uncannily subtle instruments, is able to register not only the gross movements but the minimal ones too. But, even so, we must insist that his records would still be a contribution to physiology, and only indirectly to psychology. We might say that it is the spectacular aspect of the meaning which the physiologist

[1] The very fact that it *is* a twinge of conscience, however, will probably implicate other physiological factors subserving the appropriate emotional state.

records. The psychologist's business, on the other hand, is to describe, and to attempt to explain how all this *feels from the inside.* His account will be in terms of sensations from muscles, joints, tendons, and inner organs. And since this realm of our experience is singularly poor in language which can express it—though, paradoxically enough, part of it is formed by sensations from the language apparatus itself—such a description is uncommonly difficult.[1]

According to this theory, then, meaning is the consciousness which occurs in connexion with adapted behaviour, overt or incipient, explicit or implicit. A situation, whether perceptual or merely remembered, is faced by the organism with its muscles contracting and its glands actively secreting. The remembered or "thought" situation causes fainter explosions and reverberations in the body than does the perceived situation; and perhaps too, places a different emphasis upon their relative intensities.[2] Professor Margaret F. Washburn has proposed an ingenious and attractive theory of the relation between meaning and felt movement which makes conceivable a distinction between percept and image along these lines,[3] but its implications involve several concepts which, unfortunately, cannot be explained in this brief account.

Not the least of the attractions of Professor Washburn's general theory is that its acceptance does not necessitate the denial of that stark fact, the image. There are psychologists whose treatment of the image reminds one of the countryman whose surprise on seeing a hippopotamus caused him to declare that there was no such animal. The image may be—it is—slippery, difficult to describe, evanescent, ephemeral, inconstant,

[1] This matter is discussed in chapter xii. pp. 222-29.

[2] It may also add or subtract certain muscular contractions.

[3] Op. cit.

infinitely variable, defiant of the laws of physics, unmeasurable, uncertain, coy; but in spite of all these and many other annoying characteristics it continues to flourish, and to make matters difficult for the simple-minded. Yet it is worth while to inquire how the importance of the image could ever have been minimized.

We have seen[1] that there are persons who though they know well what images are, seldom experience them in waking life. There is another class comprising those who, in their thinking, have come to rely more and more upon words, these words appearing in consciousness as the actual though faint sensations arising from sub-vocal muttering. Now, if we provisionally accept the theory that all imagery is connected with muscular movement of some kind, it is not difficult to see how the concrete image, visual or other, may have gradually become side-tracked when the adaptative activity of the organism, instead of using the diffused movements connected with trains of concrete imagery, narrowed down their locus to the speech muscles. This gradual specialization and localization occurs in the final stage of the acquisition of all skilled habits, when the learner, ceasing to employ unnecessary sets of muscles, finally performs the action as "cleanly" as possible. The speech habit, like all other habits, grew up in this way. It would share with other habits the important characteristic that the consciousness originally accompanying its performance became less vivid as the habit developed.

Some such stage must be reached by persons whose thinking is directed chiefly by formulæ, commands, proverbs, and catch-phrases. The original meaning of

[1] Cf. pp. 54, 234-35.

these strings of words may eventually fade until there is left only the attenuated consciousness accompanying the speech habit. And so our verbal formulæ sometimes become as unquestioned as our bodily habits, of which, indeed, on this theory, they are simply special examples. That, having allowed this privilege to such old retainers, we should ever ask ourselves why we repeat and believe in certain ancient tags is as unlikely as that we should voluntarily institute an exhaustive inquiry into our reasons for shaving. For this latter investigation to be set on foot the interposition of the mind of an unprejudiced, inquiring child is usually necessary; for the former, the mind of an Einstein.

It would therefore be quite natural that the undoubtedly close relation between thinking and language habits should impress the verbalizers and vocalizers[1] far more than the visualizers. For one of the visualizer's chief troubles when thinking is frequently his comparative poverty in language habits. Talking to himself, either vocally or sub-vocally, may occur so seldom to a well-marked visualizer that when it happens, in moments of stress, it may startle him.

This difference between minds may have consequences more far-reaching than psychologists have yet imagined. In order to consider it at all to-day we must plunge wildly into speculation; some of which, however, is supported by evidence too bulky to be cited here. It may be that the visualizer, by virtue of his special kind of imagery, is more inventive, is less satisfied with formulæ, speeches, orations, lectures, is habitually less impressed by and obedient to the spoken word, is less easy to reassure by means of the spoken word, is more cocksure about the correctness of a remembered experi-

[1] Cf. F. C. Bartlett, "The Functions of Images," "British Journal of Psychology," 1921, xi. pp. 320-37.

ence when its supporting image comes to him vividly, compellingly, and solidly, and is less likely to find thinking easy because the muscular contractions involved in his own particular variety of this activity are more diffused and shifting.

On Washburn's theory, imageless thought would occur when the problem set to the particular person was comparatively easy for him, when by dint of much practice, the movements underlying the thought processes involved had been simplified so that they were accompanied by muscular contractions, whether of the speech organs or of other parts, which were feeble and made but a slight impression in consciousness. If this were so, the thinker, though actually solving a question the apparent difficulty of which would impress the non-philosophical outsider, might do so without being clearly aware of the mechanisms which he employed, though actually these might be movements of speech muscles or of those used in gesticulation. Such an event is certainly not unparalleled in the world of athletics. One may see an accomplished skater, for example, execute perfectly a co-ordinated series of movements known to be difficult, while jesting with a friend. If asked how he did it, he might reply that it was carried out unconsciously. The mediocre performer, who has an inkling of the varied and complicated pattern of sensations and images which would pass through his own mind if he attempted the same feat, might suppose that the expert's finished performance involved no such events. Yet it is practically certain that many of them are implicated though in an unclear form. Possibly the professional thinkers who acted as subjects in the experiments which are claimed to have established the existence of imageless thought were so accomplished that the problems set them had been half solved

months or years before they appeared in the thought experiments. On the theory which we have been considering, the movements which accompanied such "imageless" thoughts would have been feeble, and, like all kinæsthetic experiences, difficult to localize and to name.

No attempt will be made here to describe these experiments, nor the criticisms and counter-criticisms to which their publication gave rise. A short account of them is given in Dr. C. S. Myers's "Textbook of Experimental Psychology,"[1] and in Professor W. S. Hunter's "General Psychology,"[2] and a longer critical discussion will be found in Professor E. B. Titchener's "Experimental Psychology of the Thought Processes."[3] Professor R. S. Woodworth has also reviewed the situation in an article to which we have already referred in chapter iii.[4]

There is another way of studying the relation between image and meaning which has not yet been given the attention which it deserves. It is the structural study of the dream. Let us consider for a few moments the peculiar advantages of this method of approach.

We may suppose a man, born of rich parents, to have grown up in a country which has always enjoyed a stable financial system, so that there has been no incentive for him seriously to try to understand the meaning of money. Now let us imagine that country to be afflicted with a war and a revolution, bringing with them great alterations in the values, not only of the symbols and tokens for goods, but of the goods themselves. One

[1] Cambridge, 1911, pp. 324-30.

[2] Chicago, 1919, pp. 320-42 (with bibliography).

[3] Pp. 79 f.

[4] "A Revision of Imageless Thought," "Psychological Review," 1915, xxii. pp. 1-27.

result of this may be that such a man will be driven to try to understand values; another, that these changed and changing values will themselves cast light upon the original economic condition of the country. Now for most of us the human mind is like such a country. For our thoughts, our desires, our speculations, our actions are interpenetrated in all directions by the implicit acceptance of values; logical, ethical and æsthetic. Often, for excellent biological reasons, we take them for granted, and even resist their examination or analysis. But placid acceptance of them is as inimical to real psychological thinking as would be the supposition of the permanence of financial values to economic science.

Is there, however, any event in the normal mind even slightly comparable to upheavals such as the results of war or revolution? There is at least one; the dream. The dream affords a perfect example of the alteration of values. In it the images increase, decrease, and modify their values and functions just like material wealth in war time. But to say this is not to imply that chaos and disorder are characteristic of the dream world. We have compared the dream to a carnival of the mind. The simile, though obviously incomplete and one-sided, illustrates one important fact. Although in carnival many social conventions are relaxed or abolished, usually it still retains certain unwritten laws. Moreover, a comparative study of the rules which have been suspended and those which have been retained is certain to cast valuable light upon the character of the people who are being observed. Similarly the study of dreams inevitably leads to a deeper knowledge of an individual's character and general mentality, for the events of the dream are the result of selection, just as are those of waking life. But in the dream the selective mental activity operates along lines somewhat different

from those which characterize its actions in the day, and follows directions which are often difficult to trace in the operations of the waking mind. It is therefore in the dream that we can study, from several new directions, the processes of mental control, and this we shall do in chapters v., vi., vii., and viii.

CHAPTER V

THE MODERN STUDY OF DREAMS

TO-DAY nobody who includes dreams among the phenomena of remembering feels called upon to offer any explanation of his action. But a few years ago there would have been many to object that dreams, the formless, meaningless, mental results of stray nervous currents coursing through the brain, were no more to be included among the orderly respectable recollections of mankind than is the result of shying handfuls of shot at the strings of a piano to be likened to a symphony. Nowadays, for many, the psycho-analysts have changed all that, even if the activities of some twentieth-century composers had not already diminished the contrast implied in our example. Perhaps, then, the wildest, maddest dream is merely a conglomeration of actual memories.

If so, the statement is true rather of the material and the constituent patterns than of the main design of a dream. Few dreams at any rate are intact, undistorted memories. They nearly all contribute something new to the productions of the mind. It is conceivable that occasionally this contribution is made up in the simplest possible manner by a mere re-arrangement of their constituent memories. Yet research shows the difficulty of believing that nothing but re-shuffling has occurred, and the very great probability that the new arrangement is highly significant. Usually, too, the novelty of

the thoughts expressed by these new combinations is obvious to the dreamer immediately on awaking.

There are those who believe that occasionally a thought arising in one's dream may have originated in the mind of some other personality and have been transmitted in its completeness by some process as yet unexplained. It was no part of the promise in this book's title to discuss the evidence for veridical dreams or for telepathy, nor will any attempt be made to do so. In this confined space it will be impossible, too, even to sketch the psychological problems which arise out of the suggestion that really *new* ideas, as distinct from mere conglomerates of old ones, may appear to favoured dreamers. Our present task will be confined to the consideration of the dream as a particular set of forms or patterns which memory may assume during sleep.

To describe the constituent parts of any instrument without mentioning their several functions is a dull business. Perhaps it is impossible ; how long can one think of a cog or a lever in chilly isolation from the functions for which it was designed ? Our description of the mechanism of dreams, then, cannot be divorced from a brief account of the mutual functional relations of its component structures, but no attempt will be made to discuss at length the duties executed by the dream as a whole, either in the life of the individual or in that of the race.

The usefulness of this severe restriction of our inquiry may be illustrated analogically. The practice of preserving the human body from decay, by means of mummification, is widespread through the world. It is possible to describe with great accuracy the parts of the body where incisions were made, the organs which were removed, and the preservatives, decorations, and coverings which were employed. Different forms of mum-

mification practised at different times in the same place, and at the same time in different places, can be carefully studied. From a comparison of these different procedures it is possible to describe with fair accuracy their mutual relations in space and time.

It is more interesting, however, to discover the function of mummification in the life of the individual and of the race. While this is considerably harder than the other tasks it seems safe to say that their successful achievement is indispensable to a solution of this latter problem. Only by comparing the distribution in space and time of different practices of mummification is it likely that we shall get any reliable knowledge concerning all the reasons for this curious, and to many people, nonsensical or even repulsive act.[1]

So it will be with the dream. The first problem is to study its structural constituents and their mutual functional relations in its internal mechanism. The next is to discover how far the relative importance of certain structural elements and certain functions is constant in widely different types of dream. The last is to discover the dream's functions as an integral factor in the vast complex of life.

The first, and to a certain extent, the second problem will occupy us fully in this chapter.

The Modern Study of Dreams.—"It's only a dream," is a comment which most of us make frequently without realizing what a challenge our utterance is to the twentieth-century psychologist. The educated scientific person of to-day generally thinks of the dream as a trivial, absurd, nonsensical structure. Yet it is interesting to note that the simple mind, uninfluenced by the

[1] This example is taken from Professor G. Elliot Smith's "The Migrations of Early Culture." Manchester, 1915.

teachings of materialistic science, has always believed in the dream's importance.

And to-day there exists a band of workers who once more regard the dream as deeply significant. They were recruited from a realm of study in which at present there reign almost supreme those materialistic views which would belittle the dream—the realm of medicine. For doctors deliberately to choose to investigate fantastic, meaningless, trivial, mental phantoms like dreams, when every medical school offers them rows of solid material brains, thousands of microscope slides with nerve cells and fibres ready stained and mounted, when all around them are people suffering from serious mental disorders, when every one knows that those disorders are in some way connected with the brain; does this not seem like fiddling while Rome burns?

The answer is simple: yes, if one asserts that the only way to discover the nature of mental disorders is by examining their underlying bodily mechanisms; no, if one believes that an obviously mental happening like the dream can be examined by mental means, and explained in mental terms. But, a critic may ask, and in all seriousness and honesty, why not study the more orderly, more manageable events of the mind?

An answer may be given by an example taken from another field of science. Many years ago our critic might have wondered at the strange behaviour of a man who chose to fly a kite during a violent thunderstorm. Even at the time the kite-flyer could have given very cogent reasons for his action; nowadays every schoolboy understands that much of our modern knowledge of electricity was made possible by this apparently eccentric performance. But not only does the explanation of the thunderstorm now form part of every educated person's common sense, it helps us also to under-

stand the more difficult problems of the workings of electricity in everyday situations. So it is with the dream; its processes are cruder than those of the mind doing its everyday work; it is controlled by less complex forces; its behaviour is therefore simpler and often easier to comprehend. And the study of the dream has already carried its investigators some distance towards the understanding of those thunderstorms of the mind which men call insanity.

To say that the study of the dream lies to the credit of twentieth-century psychology is to make a statement almost startlingly precise; for the foundation-stone of this new structure of knowledge bears the year 1900; the date of the publication, in Vienna, of Dr. Sigmund Freud's "Die Traumdeutung" ("The Interpretation of Dreams)."[1] To indicate in a few pages the significance for psychology of this pioneer work is difficult; to represent fairly Freud's theory in ten times this space is impossible. The reader, therefore, will understand that the few glimpses which he may catch as he is hurried past this structure must inevitably suffer from incompleteness.

Freud's way of viewing, not the dream alone, but the whole world of mental events is characterized by two important beliefs, both of which must be grasped, whether they be accepted or not, if his standpoint is to be properly appreciated. The first is that all mental happenings of whatever kind, are not only describable, but explicable, in mental terms: that an indirect account of them in terms of material processes occurring in the brain or body may supplement, but can never replace the other direct explanation. A dream, then,

[1] English translation, by A. A. Brill, London. Cf. also Freud's "Introductory Lectures on Psycho-analysis," translated by Joan Rivière. London, 1922.

can be analysed into factors which are just the experience of the individual; the stuff, so to speak, with which the explanation deals is mental and personal.

It is here that one may fittingly mention the only other theory of dreams before that of Freud, which appears to have made any serious attempt at scientific explanation. It may be called the stimulus-theory, and it assumes that the primary cause of a dream is some stimulus,[1] either from inside or outside the body, which gains access to consciousness, either by virtue of its own intensity or because of the temporary conditions of lowered resistance in the brain and nervous system which allow it to be effective. Thus, to take two actual examples: the humming of a telegraph wire outside a window "caused" a dream of bees, and the ticking of a clock in the bedroom "caused" a physiologist to dream that mercury was dropping on his laboratory floor from split rubber tubing in a gas analysis apparatus.[2]

Why, however, have we grudgingly written the word "caused" in inverted commas? Because a little reflection will make it evident that if the telegraph wire (or insulator) and the clock caused the dreams, in any real sense of the word, the dreams should have been of the insulators and of the clock respectively. The first dreamer writes: *My wife and I were in bed: the window alongside the bed was open at the top and there was a whole swarm of bees in the room. I was nervous about these bees. I heard the sound of their humming and feared lest they*

[1] A "stimulus" is a condition external to the *nervous system* (not necessarily to the body) which acts upon it. Such conditions as pains, muscular contractions, and digestive changes are thus stimuli in this sense.

[2] "Time Relations in a Dream," "Nature," 23 Oct., 1919.

might swarm on us while we were asleep.[1] "When I awoke I placed the sound of the humming as that made by the single telegraph wire which runs within a few yards of our window. The really interesting thing in connexion with the auditory stimulus of the telegraph wire is that although I have slept in the same room, under the same conditions for over four months, this is the first example of that stimulus affecting me."[2] Not only, then, was this stimulus persistently ignored by the dreamer, but when it was admitted to consciousness it appeared in a completely disguised form. Similarly, it is fair to assume that the physiologist had heard ticking clocks oftener than leaking mercury. It therefore seems justifiable to believe that these stimuli may have occasioned the dreams, but that they cannot be regarded as anything more than very important factors in the chain of events which led up to them.

The undoubted facts; first, that it is the rule and not the exception, for stimuli to be misrecognized in the dream, and secondly, that this misrecognition is not only infinitely variable, but that the way in which it takes place usually casts a great deal of light upon the personal past experience of the dreamer, makes it possible to assert that the stimulus usually does little more than to ignite a train previously laid, while thousands of such stimuli may explode futilely outside the threshold of consciousness in the absence of any combustible material.

After this explanation the reader will probably find no difficulty in regarding as psychologically meaningless

[1] In this and all the following quotations from actual records of dreams, they will be distinguished from subsequent additions or notes by being printed in italics.

[2] From E. Roffe Thompson, "An Inquiry into some Questions Connected with Imagery in Dreams," "British Journal of Psychology," vii. 1914, p. 310.

the statement that dreams are due to indigestion following heavy suppers. As Dr. Maurice Nicoll says:[1] "There is no doubt that late suppers and other disturbances of physical equilibrium provoke dreaming, but if you were to say that they constitute the explanation of dreaming you might as well see in that recent shower of rain the whole explanation of that green tinge that now covers the desert plain. It is simply an example of a common confusion in thinking. Either the activities that underlie dreams are intensified by certain physical disharmonies or the awareness of dreaming is increased by some lowering of threshold value; but the physical disharmonies do not in themselves explain the dream. They act as sensitizers. The developing solution that flows over a photographic plate is not the explanation of the areas of light and shade that appear on the white surface. It merely reveals what was already there, and what was already there depends on circumstances unconnected with the developer."

Professor Freud himself, while expressing no opinion upon the future prospects of a satisfactory physiological explanation whether of dreams or of any other complicated form of mental activity, strives everywhere in his writings to give a mental explanation of them.

His second belief is that in the mind as in the body there is no room for the action of chance; all mental events are regarded as the results of preceding mental events and as strictly determined by them. For Freud nothing accidental can ever happen in the mind. Every mental event, however trivial, nonsensical or mad it may seem to others, or even to the experiencer himself is not only the effect of preceding mental causes, but must be regarded as fulfilling some definite function in his life.

How Dreams are Studied.—An obviously desirable, but

[1] "Dream Psychology." London, 1917, pp. 25-6.

unfortunately somewhat rare qualification for the post of critic of dream theories is that he should have carefully studied his own dreams and have appreciated in himself what it means to discover their meaning. To anyone who may wish to attain more self-knowledge in this way the following suggestions may be helpful.

The dream, whenever possible, should be recorded immediately on waking from sleep. Paper, pencil, and if possible an electric lamp should be kept at the bedside. The actual dream experiences must be rapidly written down in full: nothing may be omitted, modified or added. In recording the dream use without exception the words, phrases, and syntax which first occur to you. Resist any temptation to force literary style into this record. Endeavour to forget that you are writing something which others may read and try to understand, for your own method of expression often proves to be a most valuable clue to the dream's antecedents.[1] The halting "it was either in London or Paris," is part of the halting dream-consciousness. If the dream occurred in a *staccato* manner do not attempt to smooth it out; e.g. "I was in my house and then I was in the street" must not appear as "I was in my house and then went into the street." If the dream is jumbled or thin in places let the words you use bear witness to these characteristics. Guard particularly against any tendency to omit or to furbish up unsatisfactory parts in order to make a convincing dream. And, once having recorded it, obey Freud's injunction to treat the record as a sacred text. Your later comments and additions will be useful in their right place, but that place is not the dream record itself.

[1] The style of expression of some of the dreams recorded in this book leaves much to be desired. This statement may help the reader to understand their crudity.

In order successfully to carry out the process of recording you will find it useful to remain for a few moments in the bodily position in which you woke up, in case this attitude may have affected part of your dream.[1] It is important to note with especial care doubtful, broken, absurd or unsatisfactory parts of the dream, speeches heard or made, the kind of imagery in which the dream expressed itself, and the emotional or other general bodily conditions immediately on or after awaking. It may happen, for example, that fear in the dream is followed by amusement, laughter by sorrow. The time of awaking should be recorded, together with an account of any bodily stimulus which has been detected. Any events of the dream-day—as the day before the dream is usually called—or any other incidents of one's past experience which are indubitably represented in the dream, should be recorded at once.

The Analysis of Dreams.—We may now attempt to describe the way in which a dream can be analysed. If the reader, on reaching the latter parts of this section on dreams, will bear in mind a distinction which will now be made, he will be in a position immeasurably superior to that of many of Freud's critics. This distinction is between the *manifest content* and *the latent content* of the dream.

According to Freud, that which people commonly term "the dream"; that conglomeration of experiences which they relate, not seldom with additions and suppressions, to a more or less appreciative early-morning audience, is merely the aspect of the dream which is "manifest" to them. It has been formed from material which at the time of dreaming was latent, hidden from

[1] Dr. J. Mourly Vold has shown by experiments that such an influencing of dreams by kinæsthetic experience during sleep is quite common. ("Über den Traum." Leipzig, 1910).

consciousness, just as a member of Parliament is the manifest representative of some of the opinions of numerous latent people called his constituents.

The way in which Freud formed this theory of the dual nature of the dream should not be difficult to understand by anyone who has ever detected in his own dreams the composite nature of some of the apparently new images which they contain. We may take one of the simplest examples from the writer's own collection. The dreamer noticed that the right-hand side of a Badminton court was curved like a snake, and thought that, while this addition might make play more "sporting," it tended to spoil the game. On awaking he saw at once that this picture split up into two components; an actual Badminton court to which, on the night of the dream, he had introduced a keen golfer, and a serpentine bunker which his enthusiastic guest had described to him.

Now Freud goes so far as to say that all dream images, whether recognized as composite or not, are in reality made up of memories, and that not only is their combination effected according to definite principles but that in the dream the combination itself performs definite functions of great biological importance.

To understand how it is possible to arrive at such a belief we must grasp the broad difference between two ways in which the mind can remember—by directed or by free association. If a man, looking at his blotting-pad, notices that it is thick, pink, oblong, new and absorbent, this expression of the workings of his mind may not seem unusual, either to himself or to another. But if on glancing at it he should remark "pink, sweet-pea, flower show, Wales, Criccieth, Prime Minister, politics, housing problem, huts, Pacific Islands," a spectator's comment might be that the list sounded like

the ravings of a madman. It is improbable that he would realize how near to an accurate statement of fact he had been, and that the difference between a sane man's directed association and the maniac's apparently free association is merely one of degree. For the first list above was compiled by allowing the blotting-pad to dominate the thinker's mind; the second by employing the blotting-pad simply as a launching place for the memories which were then allowed to run freely.

But *were* these memories "free"? To the ordinary English reader at the present day, the connexion between the last six of them should be obvious enough—for the thinker himself the other connexions are easily traceable to personal memories. All that is meant here by "free" is that the factors directing the path of association of the idea in the mind at the time are less easily discovered. Instead of one main idea (that of the blotting-pad) dominating the flow of thought, the direction was taken over in turn by several subjects—by holidays in Wales, politics, the solution of the housing problems in this country and elsewhere.

This "free" association occurs whenever there is removed from our minds the dominating influence of a conscious guiding idea. Freud claims that when this occurs, *unconscious* directive tendencies take over the function of guiding our thoughts, and that in this way, by freely associating from any part of the manifest content of our dream, we can discover the underlying latent material of which it is the representative in consciousness. In this way we can pass from the manifest to the latent content of the dream.

The analysis of a dream should be carried out at the earliest possible moment after it has been recorded, though immediacy is not the only factor desirable. As the reader will know, it is not uncommon for details

which one knows one has dreamt, while defying the efforts of waking memory at the desired moment, casually to stroll into consciousness later in the day either inexplicably or at the bidding of some chance event, which as simple folk say, "breaks" the dream.

As soon as possible, then, the dreamer should ask himself "What comes into my mind when I dwell upon (not merely consider for a moment) such and such an item of the dream?" Very soon such an item—especially if it be an unfamiliar one—will begin to disintegrate into simpler factors,[1] which in their turn may divide further, and so on.

In order for this to occur, at least two conditions must be observed. First, the mind must be in as uncritical and receptive a condition as possible: it must be prepared to admit any thought which may clamour for entry. Its "censorship," as Freud terms it, must be temporarily suspended as far as possible. Secondly, the dream must not, at first, be considered as a whole, as a connected story. For Freud claims that the apparent unitary form of the dream and the connexion between its elements are specious and unessential: the dreamer on awaking has spread out the items, made them hang together, and given them satisfactory coherence.

Freud strikingly compares his treatment of the dream with that adopted by earlier writers by saying that he regards the dream as a rebus, as a picture-puzzle to be solved, while they agree in treating it as an artistic composition. In the picture-puzzle each element refers, sometimes in the most direct, sometimes in the most fantastic and subtle way, to one part only of the word which is represented by the rebus as a whole. But the elements of the picture, if considered together,

[1] Cf. the composite Badminton court on p. 79.

are often highly incongruous. Thus, taking the first available rebus from one of the magazines beloved by the small boy,[1] we see, in a series representing "Great Cities," a picture of a heavily laden ship displaying on its hull a gigantic label on which is printed "The latest fashions from Paris." To treat this as an artistic production, the *tout ensemble* of which directly and completely represents its meaning, as an ordinary picture might do, is to court failure as a solver of rebuses. Yet this is the way in which we have been accustomed to approach our dreams. To object that ships do not carry large labels on their hulls, and that even if they occasionally did so, the labels would probably justify their existence by conveying information of more direct use to passing navigators, and that therefore the whole picture is absurd, is merely to criticize in the tiresome manner characteristic of not a few dream critics who have not grasped Freud's meaning. But if we adopt the special devices of the rebus-interpreter, expecting to find no necessary intrinsic connexion between the elements of the picture, we immediately arrive at its meaning—*Chicago.*

We proceed in the same way in the analysis of the dream. In the rebus the apparently incongruous juxtaposition of "chic" and "cargo" is justified by the meaning of the result of their composition. So in the dream, experiences apparently quite unlike each other often prove to have one characteristic in common, and that a highly significant one for the dreamer himself.

We have said that the mind must be allowed to associate ideas freely with those of the dream. By this is

[1] The reader must, here and elsewhere, be asked to endure patiently this laborious analysis of a trivial example. At present, the obvious and the trivial offer many important problems for psychology.

meant that the dream investigator, beginning with some one fact of his dream, considers it in a reflective manner, unchecked and undirected in any way. He must cultivate an attitude of complete mental passivity towards the trains of irruptive ideas, allowing them to pass freely through his mind, however unconnected with the dream, however foolish, nonsensical, or unacceptable they may appear to him. He will soon experience a tendency to check an arising train of thoughts or to redirect his path. Such a temptation must be withstood, for it is just here that the censorship is re-asserting its influence. Often there will appear gaps in the train of ideas; places in which the mind appears to be a blank, or seems, although not empty, to present nothing clear enough to be recognizable. These are frequently times at which a conflict is occurring between two chains of ideas, possibly between one which is under the ban of the censorship and another which is not. But if the gaps be not taken as signals to begin again from another train of thought, unexpectedly illuminating factors often emerge after a short time.

It is quite clear that the ability to carry out such an unusual mental activity must vary very greatly in different people. Not every one can become an observer, even of the simplest of his own mental processes, without long-continued practice; still less can one hope to discard in a moment all the attitudes and prejudices towards oneself which a lifetime has sedulously built up. But unless such a new mental attitude be temporarily achieved the dream will still remain an impregnable fortress.

It must not be supposed that the analysis of all dreams will be possible even to the person who is fitted, temperamentally and by training, to follow Freud's precept "to curb in himself every criticism, every prejudice,

and every affective or intellectual one-sidedness." This mental attitude is usually very difficult to assume, and it is now generally believed that the greater the disguise in the manifest content, the stronger will be the unconscious resistance of the dreamer, even when he tries to associate ideas freely with its contents, to the uprising of the dream thoughts represented by them.

Psycho-analysis.—For this reason, "psycho-analysis,"[1] as the process is called, is frequently carried out by a second person. His task is to suggest the points in the dream at which free association is to be commenced, to note the associations as they arise, and to observe carefully the behaviour of the subject, as the various ideas occur to him. The subject himself is comfortably seated with his eyes closed, and is asked to assume a dreamy state of reverie, so that the ideas simply "come to" him. (It is sometimes useful to seat him so that he faces a wall, and has his back to the analyst—a position in which some people are less conscious of the presence of a second person—but to arrange matters so that the recorder can still catch a glimpse of the subject's facial expression.) Various devices are possible to the psycho-analyst which could not be used by a subject examining his own dreams. He may note the points at which the subject declares that there are gaps in his train of thought; the gaps, according to Freud, being caused by the resistance of the censorship. By urging the subject to continue his efforts, and by reminding him of earlier ideas associated with these items, such gaps may often be bridged. Or suddenly asking the subject to repeat the contents of his dream, the analyst may compare the repetition with the original account. Not only, according to Freud,

[1] For a description see Freud, "Interpretation of Dreams," p. 84 f.

are the parts which are subsequently forgotten important, as being portions which the censorship has "confiscated,"[1] but those passages which the person states in words different from those of the earlier account, or even falsifies, are also signposts to those dream thoughts against which the resistance is greatest.

It will be found that although the mind wanders, apparently quite aimlessly, it returns again and again to the subjects of the dream. And, before long, surprising connexions are seen between the different trains of thought which lead from the various points in the manifest content. These connexions are often effected by the most astounding superficial associations resting upon chance similarities of appearance or of sound, plays upon words (often names of persons) which, if uttered in the waking state, would cause the hearers of them to deny the good taste, if not to suspect the sanity of the speaker. But the dream's methods of thought are not those of the normal adult waking state, and many of their chief characteristics may be found in the mind of a very young child.

A supplementary procedure is the well-known word-association method of Dr. C. G. Jung, which has been described so frequently in the past few years that it is probably familiar to the reader,[2] and therefore need only be mentioned here.

[1] See discussion on the forgetting of dreams, pp. 151-54. The meaning of this passage will perhaps be clearer and more satisfactory to the reader when the dreams in chapters vi. and viii. have been considered.

[2] See C. G. Jung, "Studies in Word-Association," Bernard Hart, op. cit.

CHAPTER VI

THE MECHANISM OF DREAMS

The Dream-Work

THE transformation of the latent content of the dream into its manifest content is called the *dream-work*. This process is not active during the actual occurrence of the dream, but, according to Freud, goes on incessantly both in our waking and sleeping life. The dream he compares to a firework, which, though its display may last only for a few seconds, requires days for its preparation.

What is the function of this dream-work? According to Freud, it is to distort or transform the latent content into a shape in which it is acceptable to our consciousness. And here we enter upon a part of the theory which can only be inadequately sketched here. We have seen all through the preceding chapters that the activity of consciousness is always selective, that any thought of which we are temporarily aware is simply the apex of a pyramid of memories associated with it. If that thought be allowed to develop, some of those memories will emerge into consciousness, while others will not.

Freud believes that one of the most important functions of consciousness—that which, employing a social

analogy he pictorially terms the "censorship"[1]—is to shield the mind as far as possible from experiences which would be unacceptable to it. In waking life the function of this censorship is usually to repress certain thoughts and desires, the dim premonitory shadows cast by these coming events being sufficiently unlikeable to ensure a refusal to admit them into consciousness.[2] In sleep, however, the vigilance of the censorship is relaxed, and the forbidden thoughts—banned because of their painful, immoral or ugly nature—may clamour for admittance. The dream is a compromise by means of which these thoughts or desires are allowed to enter consciousness, but in a disguised form. This distortion allows them to pass the relaxed censorship, and at the same time permits the sleeper to continue sleeping: for, Freud believes, had the banned material entered the sleep consciousness in its undisguised form, it would probably have wakened the sleeper by producing fear. According to this theory, then, the dream is a preserver, not a disturber of sleep. The sole exception occurs in the case of the fear-dream.

The processes of the dream-work which Freud has described are of intense interest to psychologists, for even if his theory of their function prove to be incorrect or inadequate, there appears to be ample evidence confirming the accuracy of his account of the processes themselves. The evidence, indeed, makes it extremely probable that they are operative not only in fashioning dreams, but in the work of the waking activity of creative imagination, of literature, poetry, and art, the relation

[1] Cf. W. H. R. Rivers, "Freud's Conception of the 'Censorship,'" Appendix V to "Instinct and the Unconscious." Cambridge, 1920, pp. 228 f.

[2] The subject of repression is treated more fully in chap. ix.

of which to the dream many before Freud have suspected though none have explained.

In the dreams of ordinary people the scenery and the actors are usually fashioned out of visual images.[1] It is therefore natural that the dream should be essentially symbolic. But according to this theory not only each person and thing in a dream but any part of them, any dream-word heard or seen may be symbolic of a whole mass of meaning, which is represented by this complex symbol or *condensation.* In chapter viii. one of the writer's dreams, which will be analysed in detail, illustrates this condensation particularly well. In it the stage and scenery proved to be composed of two city squares, four restaurants, two lantern-screens, two laboratories, and two manuscript papers, while even the speech heard was a condensation of two such sentences. Moreover, each of these visual symbols represented extremely rich meanings in the dreamer's life, all of which were strictly relevant to the theme of the dream, the temptation to break a promise already given. Even in everyday life, however, symbolism often exhibits condensation, as anyone can see who cares to examine the badge of the Royal Army Medical Corps, or our own Union Jack.

Connected closely with symbolism, in that it forms one important aspect of it, is the process known as *dramatization.* In the dream the mind reverts to primitive methods of expression, to a state of affairs which we have compared to a return from our present,

[1] That this is by no means essential will be obvious when one remembers that the congenitally blind, who can form no visual images, and those persons who, becoming blind before the fifth year of life, tend to lose the power of visual imagery, can dream. Dreams in which auditory imagery plays an important part are described by E. R. Thompson, op. cit. pp. 312-13.

highly abstract credit system, to a primitive habit of barter. In the dream the thoughts are often represented in their rawest form, in images of concrete objects or of persons. And since visual images not only form the chief memory apparatus of most minds but have acquired in our present civilization a richer meaning than images from other sense-spheres, most dreams are mainly visual in nature.

The dream-work may be compared to that of the adapter of a novel for the cinematograph. By him abstract relations must of necessity be represented pictorially or ruthlessly cut out: thoughts may be expressed only if they are capable of being dramatized. The picture playwright, however, has one advantage over the dream; he can plug the awkward gaps in his dramatic representation by the invaluable interpolated sentence. On the other hand, if Freud be right, the dream possesses a gift still more valuable; the emotional result of its performance is assured from the beginning. For the emotion, he says, is the only real thing in the dream; the only experience which is not imaged.

Two of the writer's own dreams seem to him to illustrate well these processes of dramatization and condensation. The first represents in one momentary incident a whole number of converging systems of thought. The nature of some of them will probably be clear to a reader who is at all familiar with the problems of modern psychology. The actual record of the first dream is as follows:—

Dr. T. was in the University Staff Smoking-room, after the Degree-Day ceremony, and had said goodbye to all of us, his colleagues, before leaving for a new post. Just as he left the room, he wrote in a bold hand on the wall, with black charcoal or pencil, the word "dunamis"; then with a dramatic gesture he went out.

I will take from the notes of my free association to the various parts of this dream a few extracts which suffice to show that Dr. T.'s action was tightly packed with meaning, both personal and impersonal, for me.

"The *Degree presentation*[1] is to be in a day or two, and my thoughts have turned to it very often during this week. I have promised to go to dinner with *Dr. T. after the ceremony.* At the *farewell* dinner, given to him by the *staff* (which ended in the *staff smoking-room,* the scene of the dream, in which I have met him so many times) others had mentioned his *great activity.* He had himself jokingly referred to *his strenuous nature* as a possible cause of occasional differences of opinion with colleagues.

"In some psychological writings of his, the proofs of which I read for him, he refers to his emphasis upon the *dynamic* aspect of his subject. On the dream-day I met with and spent some thought over a similar treatment of the subject by a man who will now be T.'s colleague in his new University.

"The *writing* is also an experience from the dream-day. I had noticed that the errand-boys, following their usual custom while waiting at doors, had decorated the inside of the porch of my house with *inscriptions in pencil*—one bold spirit had used *black chalk.*

"I had attended Dr. T.'s lectures, and had often seen him write on the *wall*-blackboard, though he had never written any word of the kind I see in the dream."

But the thought which, during free association, occurred at once to me along with these personal details, was that of the writing on the wall at Belshazzar's feast. It was one of the most impressive and terrifying of all the Scriptural tales which I heard in my child-

[1] In the records of free association, italics will signify items occurring in the manifest content.

hood, and I still remember a picture in one of my books which fascinated and frightened me. The impressiveness of the action in the dream was very great indeed, and it requires little imagination to suppose that Dr. T., a friendly but fearless critic, who had preached the gospel of strenuousness so well and exemplified it so indefatigably, emphasized its importance, to his less active colleagues, with this Parthian shot.

In many, perhaps in most, dreams, the motives expressed by dramatization are not so obvious as in this example. One reason for this may be that every element in the dream is so saturated with significance that it is difficult or impossible to believe that the dream has *a* meaning. For to the dream the *double entendre* is an elementary feat ; it often kills a small flock of birds with its one stone.

The mechanism which makes this possible—condensation—has already been mentioned. An unusually tightly packed condensation will now be dissected.

As we have seen, experiences in the manifest dream content which seem to be entirely new to the dreamer often fall apart upon free association, resolving themselves into memories of actual events which have fused with each other. Strange persons, places, or objects prove to be merely composite, new words to be merely those old friends, the " portmanteau words," which we know so well in waking life ; even dream speeches, heard or spoken,[1] are believed by Freud (and in many cases he is undoubtedly right) to be merely fusions of memories.

[1] This statement must be taken at its face value. The investigator of his own dreams will soon discover that not all speeches in dreams are expressed in definite auditory or vocal-motor imagery. Frequently one merely *knows* that so and so was said ; an entirely different matter from the standpoint of the psychologist.

The following fragment of a long dream, vividly remembered, illustrates several of these facts :—

I am going to the shore at Hunstanton. It also seems like the shore at Birkdale, as I feel that the . . . "Hydro" is just near me. It is a late October night, all dark and lonely, yet just light enough to see the foam washing round my feet. I soon see my father and am swimming in the sea. A little fast yacht, which is only really the size of a large toy yacht, perhaps 5 feet long, cuts about in the foam near us, with a red light behind it. I feel that it has something to do with history, and my father says "Look at its emergency spike." This refers in the dream to the red light, which is trailing behind a yard or two in the water.

"I awake seeing the incongruity in the last sentence, and observing how in the dream I was quite conscious that the name was applied to the light."

I give, as before, an extract from my notes taken during free association after the dream.

In this dream the condensation of Hunstanton and Birkdale is a transparent affair, probably due to the fact that they are two seaside places visited successively shortly before the dream. The interesting problems are afforded by the mysterious words "emergency spike," their unfitting connexion with the red light, and the very unusual practice of the yacht in trailing its red light in the water.

Some of the components of this strange dream-structure came to me after very little reflection.

On the dream-day I had been looking at some excellent photographs in an illustrated paper, of various methods of pouring oil on stormy seas.[1] One arrangement de-

[1] This was at the end of October, 1913, when a vessel's crew having been saved in a storm by pouring oil on the waves, several newspapers contained detailed accounts of the means employed for this purpose.

picted a bag of oil which was to be thrown overboard in *emergency*, and *trailed behind the vessel*. The instructions to the sailors were to pierce the bag several times with a sail-*spike* or needle before throwing it out.

In the local newspapers at this time there was appearing a violent controversy concerning the advisability of compelling cyclists to *carry red rear lights at night*. The question interested me as a cyclist, and on the dream-day I had taken part in a somewhat heated argument concerning it with a friend who was a motorist.

On the dream-day, too, I had been lecturing on colour-vision, and had mentioned in this connexion the establishment of a committee of scientists to deal with this subject. The dream opens with a reference to a British Association meeting during which this committee sat. One of the chief questions which it discussed then was the testing of the ability to see *red and green lights on a vessel at sea*. I had quoted in the lecture a well-known case in which the value of these tests was disputed. After the lecture I had spent the rest of the morning in giving colour demonstrations, and had then read the report of another committee on colour-blindness. Finally, just before I went to bed, a friend told me that he had mentioned me as one who would be willing, if requested, to lecture on colour-vision. It is then clear that the fantastic conclusion of this portion of my dream is a condensation.

This analysis is clearly incomplete. I should like very much to understand the connexion of the yacht with history—a problem which has defied my efforts. But enough facts have been discovered to put the conglomerate character of the fragments beyond doubt. The yacht and its trailing light, as well as the curious speech, though they appear new, are merely condensations of objects and words respectively.

I venture to include the following dream because it may interest those readers who are not habitual visualizers. To others it will be easily recognizable as an everyday affair, yet it is, perhaps, not without value, for it seems to display very clearly some of the processes which characterize the thinking of "minds of lowly organization," as they were termed by a friend who himself had outgrown visualization.

I was with Professor C. We go out of the room, and he is talking to me about the future of psychologists, and the young psychologists. He praises the tendency to investigate psychological questions experimentally, and I am pleased, but he adds "You experimentalists will approach, but never come quite at the truth; just as a photograph is never so like the subject as a picture, so the non-experimental method will always be the better one." I am disappointed at this; I feel that he is wrong and that his analogy is badly chosen, but that there is a lot in what he says. We are going downstairs, and as he speaks he points to a beautifully taken photograph on the wall. It is very like a picture.

On awaking, I at once understand this simile to mean that, just as the mechanical accuracy of the photograph might fail to express the message of the picture, the scientific precision of the experiment might not succeed in catching the spirit of the real experience. The latent content showed how full of meaning this comparison was.

A note added subsequently: "The scene was like the stairs leading from a photographer's studio," made the sources of the dream easy to find, and showed how accurately the thought was illustrated by the picture to which the professor had pointed. For before going to bed I had been discussing psychology until a very late hour with a friend, U. During the conversation U had

shown me a new photograph of himself. I had then thought that the photographs taken by T were better, though this was a good one. T is a first-class photographer who is very clever in making his photographs resemble pencil sketches.

I had been speaking of weddings to U, and had then thought of a wedding-breakfast which took place in an artist's studio. During the same conversation I had reflected upon the dogmatism of some writers on dreams, and upon the number of their statements which called for empirical examination. Professor C., in expressing the hope that I was not devoting the whole of my time to purely experimental psychology, had used the phrase "you young psychologists." The only photographer's studio visited by me recently was T's. It is reached by climbing many flights of stairs.

The dream's prospective function[1] is illustrated here. By means of an analogy it makes clear to me a truth which at that time I had apprehended much less clearly than I do now.

The third of the dream mechanisms described by Freud is called *Displacement.* One result of this process is the transformation of accent which the dream-thoughts undergo in their representation in the manifest content. Freud holds that those points which appear most interesting or important in the manifest content are frequently deceptive in that the real interest of the dream has been represented by some insignificant, perhaps dimly remembered, part. It is as if the focus of the dream had been deliberately shifted. Borrowing the well-known phrase from Nietzsche, Freud says that the dream-work brings about a "transvaluation of all values." The dream-analyst, therefore, does well not

[1] Cf. C. G. Jung, "Analytical Psychology," translated by Constance Long. London, Maurice Nicoll, op. cit.

to be misled by the arrogant strut of the dream nobodies: he must learn to look beyond them to the important beings who stand about modestly in the rear. In particular, a fact of the dream which seemed to the dreamer so unimportant that he nearly forgot it, or one which he actually forgets and subsequently supplies, often proves to be the gate opening into the shortest road to the latent content. Altering the simile, Freud says that the dream is in no sense a symmetrical or well-balanced structure; its most important point is seldom obvious on casual inspection; the dream is eccentric.

It is further stated that displacement is not confined to interest or psychic accent, but it can also be observed in connexion with the emotional tone or affect connected with the latent content. An affect attached to a latent thought which is under the ban of the censorship may appear in the apparent dream in connexion with another thought superficially related to the former, which is free from such proscription. The affect, Freud says, is the only true thing (*die einzige Wahre*) in the dream. It alone is allowed to appear in its true colours. But the reference which we give it may be completely erroneous. In the dream we are really afraid, annoyed or pleased,[1] but our very real emotion has been derived from sources other than the one to which we attribute it. On inspection, as every one knows in the case of fear or pleasure, the dream element attached to the emotion may seem to be quite an inadequate cause for it.

Freud considers emotion in a completely original

[1] By this is meant that unlike the cognitive elements in the dream, which are images, the emotions are not imaged, but actual, immanent.

manner. Dr. Ernest Jones says,[1] "His views on affective processes differ from those currently accepted. He thinks that the amount of emotion (*Affektbetrag*, *Erregungssumme*) spreads itself over the memory trace of ideas, rather like an electric charge over the surface of the body. Most significant is the assumption that it has a certain autonomy, so that it can become released from the idea to which it was primarily attached, thus entering into new psychical systems and producing wide-reaching effects. This displacement of affect from one idea to another Freud denotes as *Transference* (*Übertragung*) and says that the second idea may in a sense be termed a representative of the first."

Freud emphasizes his view of the detachable character of the emotions by speaking of them as being merely "soldered" to their respective thought-systems. Such a revolutionary theory would require for its examination a treatment too long for this book. But we may notice here two points. "Displacement" labels some important facts of everyday experience. We have all met persons, who, unable to work off their anger on its real cause, vent it upon unfortunate innocents. The loss of a person dear to us is made all the harder to bear if there is nobody to whom we can transfer at least in part, our affection. And phobias or unreasonable fears, when examined with care and psychological insight, justify the belief that their real cause is not the fire, the height, or whatever it may appear to be, but that the fear comes from deeper, masked sources.[2]

[1] "Freud's Psychology," "Psychological Bulletin," vii. 4, 1910. Cf. chapter iii. in "Papers in Psycho-analysis," 2nd edition. London, 1918.

[2] For Freud's views on the phobias and obsessions see "The Interpretation of Dreams," pp. 459 f., "Selected Papers on

The second problem which the discussion of displacement raises is the nature of the affect itself. To the question, "How is it that the affect is the only true thing in the dream?" the answer may be that affects are distinguished from percepts in that they cannot be imaged, but are immanent. This was the view of Professor Oswald Külpe, for whom this property of immanence distinguished feelings from sensations.

Images are evanescent; in some minds they may never be vivid, and their appearance and nature depend in quite an arbitrary way upon what we still call, for want of knowledge, a person's "powers of imagery." These powers are so capriciously distributed that a person with normal vision, for example, may be quite unable to call up any but the faintest visual image. Yet it is improbable that the power of recalling pleasure and unpleasure varies from individual to individual so tremendously as this. For, if it did, one can scarcely understand how learning by experience of the primitive "trial and error" kind could come about. Biologically, therefore, it would seem important that the power of recalling feelings should be less open to capricious variation than the power of recalling merely cognitive experiences.

Nobody who has ever experienced nightmare will contest the claim that its fear is real. Frequently, too, it persists long after the dreamer, awakened, has been convinced of the unreality of its cause. The dreams from which one awakens in disgust frequently leave behind them sensations which remain for a very long time. In both these types of dream bodily contributions to the fear or disgust can often be detected; in the one

Hysteria and Other Psycho Neuroses" (trans. by A. A. Brill). New York, 1909, pp. 121-55, 186-93, and his "Introductory Lectures on Psycho-analysis."

case quickening of the heart-beat and respiration, or increased perspiration; definite nausea in the other. It seems probable, therefore, that the affect in the dream is "true" because, being reinstated, and not imaged, it has not been subjected to the many omissions and additions which are common in the case of images.

It is at least conceivable, though this does not appear to be Freud's view, that displacement follows inevitably from the nature of the processes involved in symbolism and condensation. To recall one of our earlier examples, many members of the present Coalition Government[1] are acting as symbols for a very closely packed condensation of the heterogeneous desires of their constituents. It therefore follows that some of those desires are not fully expressed in the subsequent behaviour of the person who was elected to represent them. So it may be with the dream; the formation of a compromise-symbol will inevitably involve a displacement of the relative importance of the several desires represented by it, and therefore the part of the manifest dream which appears to be the most important for the dreamer will, on examination of the latent content, often prove to be less so, while a fact in the dream "so unimportant that I nearly forgot it" sometimes unlocks the gate immediately leading into the latent content. The first noticed or the most striking features of the dream are not necessarily the most important.

We pass now to the last mechanism of the dream-work; *Secondary Elaboration.* This process differs from all the rest in one important respect; it is a function of the waking life. Freud believes that on the return to the waking state the action of the censor is to remove, as far as possible, the traces of its defeat during the night. This it does in two ways: by confiscating

[1] This was written in 1920.

as much as it can of the manifest content,[1] and by falsifying it in memory. This latter effect is achieved first by supplying logical connexions between elements which in the dream were disconnected; links which are only the fictions of waking life; secondly, by plugging the gaps in the dream with plausible stoppings. Such supplementation can be easily observed if one makes a practice of writing down dreams immediately after waking, and subsequently comparing accounts of them given from memory at different intervals. Freud says that these interpolations are often reported irresolutely, prefaced by words expressing hesitation—"It was as if——" etc. He claims that these "cementing" thoughts are subsequently forgotten more easily than the genuine products of dream material, and that the action of secondary elaboration is not only of this positive kind; for an important aspect of its activity is the omission of various parts of the dream.

It is the observed effect of this mechanism which has caused some writers to claim that the dream's nature can never be known to us. They say that once we are awake we are but trying to describe a jumbled, disconnected set of monstrosities. The very nature of our everyday language which we must perforce employ accounts for the illusory elegance, continuity, and fluidity of the narrative.

But with increasing practice in reporting dreams, much of this elaboration ceases. The expert dream reporter can often distinguish between disconnected scenes which succeed each other instantaneously, like the projection of two successive cinematograph films cemented to each other, and that change of scene which occurs naturally and gradually as when he walks out

[1] It is a fact of common experience that dreams are usually forgotten with great rapidity after awaking. Cf. pp. 151-54.

of his house into the garden. He faces with increasing equanimity a part of his dream which is confused, desiring neither to conceal his "poor memory" nor to interpret the unclear part in order to bring it into agreement with the rest of the dream.

CHAPTER VII

RIVERS'S VIEW OF THE DREAM. SUMMARY OF CHAPTERS V, VI, VII

THE purpose of chapters v. and vi. is to present the processes of dreaming in their proper relation to other events of remembering, to describe their peculiarities, and, as far as possible, to account for them. We have already mentioned that the more difficult task of ascertaining the function which the dream performs in the general life of the personality will not be attempted in this book.

By this time the tremendous impetus which Freud's example has given to the study of dreams is showing its effects upon general psychology. There are already psychologists who gladly acknowledge that they owe to Freud the initial suggestions and the stimulus to carry out investigations of dreams, but who, while accepting some of his theories, have modified or extended them. Particularly is this true of some medical psychologists who have encountered thousands of examples of a certain type of dream which can be fitted into Freud's general theory only by the most Procrustean treatment. This is the undisguised and terrifying dream of battle. It is the consideration of this dream, the nightmare, and the undisguised sexual dream which has led Dr. Rivers to contest at several significant points Freud's explanation

of dreams, more particularly at those concerning the censorship, the alleged sleep-preserving function of the dream, and the wish-fulfilment theory.[1] These deviations, in so far as they concern the mechanism of the dream, will now be considered.

As Rivers views it, the dream arises out of mental conflict, and is an attempt, successful, partially successful or unsuccessful, to solve a problem. The mental mechanisms, however, which in sleep are available to bring about such a solution are earlier in origin, more primitive or less developed in nature than those which usually dominate the waking life of the civilized adult. He conceives the existence in each individual of a hierarchy of levels of potential behaviour. Each level controls the one below it and in its turn is controlled by that above it. A temporary or permanent throwing-out of one or more of these upper levels of controlling agencies may be brought about by many factors. Prominent amongst them are situations appealing to the powerful instincts, such as those which arouse the emotions of anger, fear, or sexual excitement ; the action of many drugs, of which alcohol is the most widely used, endogenous poisons such as those engendered in febrile states, and finally, normal sleep and its sister (or cousin) state, hypnosis.

We have described these levels as levels of potential behaviour, and indeed, provided that we adhere to such a general description, we are following faithfully the late Dr. Hughlings Jackson's conception of neural levels. Rivers, however, goes much farther and characterizes them as levels of *unconscious experience.* His conception might be expressed graphically, in some such

[1] "Dreams and Primitive Culture," Manchester; "Instinct and the Unconscious," pp. 228-40; "Affect in the Dream," "British Journal of Psychology," 1921, xii. pp. 113-24.

way as this. The following are the chief levels of experience, in their hierarchical order :—

Experience belonging to adult life.
Experience belonging to youth.
Experience belonging to childhood.
Experience belonging to infancy.

These levels are not supposed to be discontinuous, but, like those of the nervous system, they pass into each other by infinite gradations. The possibility that there may be a still lower level derived from the inherited experience of the race, is left aside by Rivers, though he assumes that if there were such a level it would be controlled by the individual's acquired experience.

In what respects are these levels of experience supposed to differ? They may differ not only in the nature of the mental material of which they are composed; in that they contain the memories of infancy, childhood, etc., but also in the manner in which they come into action, each one preserving, and subsequently exhibiting the characteristics of the mentality in which it had its origin. Thus the methods of thinking, feeling, and acting characteristic of infancy or childhood would be shown whenever these levels respectively were brought into action.

Such a conception would explain why the adult victim of nightmare, or of an unreasoning gust of neurotic terror will often maintain stoutly that he knows no fear like it; that its quality, its flavour is quite exotic and that often he cannot deal with it, while he is quite a match for the type which the grim flippancy of the twentieth century has labelled "wind-up."

Freud had already taught that the dream appears to

be a fragment of infantile life. It was generally obvious, too, that in the dream we may behave childishly or take up a childish attitude towards its problems. Moreover, in treating the psycho-neuroses, of which for Freud the dream is a miniature, almost every one must have said at some time that the patient behaves like a child. But Rivers, by his conception of levels, makes it easier to understand not only the dream in which an adult behaves childishly but those in which he thinks, feels, and acts, perhaps, adolescently, youthfully, and possibly, if he be old, middle-agedly. Rivers helps us to appreciate more successfully the advantages enjoyed and the disabilities suffered by those who won't grow up, as well as by those who grow up too fast. He casts more light upon the troubles of adaptation which occur at important transitional or critical periods of life—at puberty, adolescence, marriage, maternity, the menopause, or senility. Many persons when they reach one of these stages refuse to grow up, and, clinging to simpler levels of behaviour which do not adequately meet the situation, involve themselves in wellnigh hopeless difficulties. Perhaps to some extent these troubles are physiologically conditioned. It is conceivable that the process of formation of the new physiological level is obstructed by the mental and physical habits of the individual.

In what ways does this view differ from Freud's? Firstly, in that it regards the form in which the latent content of the dream manifests itself as something inherent in the experience which forms the latent content or in the mode of activity by which it is expressed. This method of expression is quite regardless of its effect upon the sleep of the dreamer. Though its infantile character may be useful in maintaining sleep, if there be such utility, it is a secondary aspect of the process.

The character of the dream is primarily the result of the way in which the mind has been built up, and the essential feature of the dream is that it is a product of the general principle of the development of mind.

The acceptance of this view would make the Freudian conception of the censorship to appear as unduly narrow, for that control of which it is now regarded as a special example characterizes the activity of the whole nervous system always and everywhere. Weakening, removal, or partial laming of this control is immediately followed by manifestations similar to those which are ascribed to the failure of the censorship.

Recently Rivers has developed these views in their application to the problem of the affect in the dream.[1] Freud had already pointed out that the manifest content of most dreams shows a distortion, or as Rivers prefers to term it, a transformation, of the cognitive elements in their latent content. This qualitative distortion, however, does not appear to be suffered by the affect, which, Freud says, is the only true thing in the dream, though he believes that it may appear in the manifest content attached to some cognitive element to which it does not properly belong.[2] Both writers agree that a dream, the manifest content of which contains little or no affect, may represent a latent content of very great affective significance, and that, if it appeared in consciousness undisguised, it would produce intense emotion.

Freud's view is that the purpose of the dream is so to transform the latent content that little or no affect is experienced by the sleeper. Rivers agrees that where there is considerable transformation there is little affect;

[1] "British Journal of Psychology," 1921, xii. pp. 113-24.
[2] Cf. pp. 96-7.

but going farther, he brings forward evidence to support the theory that the intensity of affect is inversely proportional to the amount of transformation. This evidence consists of the battle-dream accompanied by fear and the undisguised sexual dream accompanied by sexual excitement—just the two types which respectively count most heavily for or against Freud's wish-theory.

In both these types the affect is intense; in the first unpleasurable; in the second pleasurable. The antecedent condition of the former is a conflict between the tendency of the experience to recur and the wish that it shall not do so. The dream represents a complete failure to solve this conflict and the success of one of the antagonists. The affect is painful because the conflict fails to satisfy the most prominent wishes of the dreamer. The latter is pleasant if it gratifies his most prominent wishes. But in most dreams the affective aspect is slight or absent because the struggle is transformed and the solution of the conflict is only of a symbolic kind. This is shown in the dream which is analysed in detail in chapter viii.

We may now attempt to summarize the preceding chapters on the mechanism of the dream.

Usually—perhaps always—the dream is composed of recalled experience. It can therefore be included among the phenomena of memory. While all memory is selective, the dream usually exhibits the results of this picking and choosing in a pronounced form. Occasionally, however, as in certain recurrent dreams of warfare, the effect of these selective activities is difficult to demonstrate. It is even conceivable that dreams of this kind approximate more nearly than any others to a faithful revival of experience. Yet the directions along which selection takes place in the dream work, though they

may not differ in sense or number from those which operate in waking life, certainly exhibit a different order of importance. A consideration which in waking life would usually be dominant often appears in the dream to be insignificant, and vice versa.

There is good reason to believe that if the order of relative importance assumed by different directive tendencies in the dream of a person were operative in his waking life for more than a very brief period, his personality would appear to others to resemble that of an individual younger, or at least more primitive and unbridled, than himself. Thus at different times the dream of a healthy and conventional cultivated adult may exhibit the pattern of mental processes characteristic of a less restricted adult of the same age, a youth, a child, or perhaps even an infant. It may resemble the waking mental life of those folk who were termed savages, in the comfortable nineteenth century. Lastly, it may be a miniature example, occurring during sleep, of the waking activity of an individual, formerly healthy, cultivated, and conventional, who, through a failure of higher controlling forces, has reverted to a more primitive attitude towards the demands of his environment.

The dream, in short, appears to represent an attempt to meet life's demands by a simpler method than is customary in the dreamer's waking experience. Plato expressed one aspect of this conception when he said that the good man contents himself with dreaming what the bad man actually does.

This simplicity is exhibited both in the dream's apparatus and in its functions. The dream stoops to the use of concrete symbolic imagery for the same reasons that in actual life, when confronted with a problem the solution of which is temporarily impossible, we look

round for a symbol upon which we can throw enough strands of meaning to help us swing across the gulf. The mathematician's *x*, the country's flag, the Germans' Hindenburg statue, the money-swallowing tank of the War Savings campaign, the savage's idol, and the fetishes of the lunatic and the lover; all are concrete static pegs upon which meaning may be heaped. So the dream displays in an exaggerated form all the advantages and drawbacks of concrete imagery; and so it resembles—perhaps even it is—the thinking of the primitive mind.

The images in the dream are often the product of condensation. Yet this is by no means a feature exclusively confined to the dream; probably few of the visual images of waking life are free from such contamination, and in some measure this may be true of images from other sense-spheres. But the determinants for such fusion in the dream itself are characteristic of a cruder level of mind. So it happens that dream cartoons,[1] though occasionally they display the gentle suavity of Mr. *Punch*, when he is on his best behaviour, not seldom flaunt before the embarrassed waking consciousness the acrid cruelty or the frank indecency of *Simplicissimus*.

It is sometimes claimed that the processes of the dream work are unique, that they have no parallels in waking life. This is inadmissible. Freud's view: "It is condensation that is mainly responsible for the strange impression of the dream, for we know of nothing analogous to it in the normal psychic life accessible to consciousness,"[2] is expressed too absolutely. In the minds of many people, especially of those whose visualization

[1] See footnote to p. 111.

[2] "The Interpretation of Dreams," p. 471.

is so strong and habitual that for them even abstract thought is accompanied by visual imagery, condensation is continually happening.

Let us suppose that such persons are thinking of a dog, though of no dog in particular. In their minds there will usually be a visual image with a fair degree of definition, though it may represent no existent animal.

Such a "generic" image, as it was once called, has been compared to the composite photographs obtained by Galton,[1] who printed in exact superposition many photographs of members of the same family or of persons following the same occupation. As a result, the features which were commonest stood out sharply in the final print, while the effect of a feature possessed by only one member, however prominent it might be, was obliterated in the fusion. It was supposed that a similar principle accounted for the formation of generic images; that, in our example, the dog image was a compromise between all the dogs the person had ever noticed.

But such a supposition is certainly not supported by an examination of the facts. It has been pointed out that this comparison omits, among others, the important consideration that the generic image is often coloured, while the composite photograph is not. And, moreover, the colour in the image need not be, by any means, the result of a fusion of the remembered colours, apart from the obvious unlikelihood of such a process taking place. Usually the colour is transferred from some one particularly important experience which has contributed to the formation of the generic image.

[1] "Inquiries into Human Faculty."

While I wrote the last page, my image of a dog in general was quite definitely that of a black-and-white fox terrier. It was certainly not a fair compromise between the sheep-dogs, retrievers, Irish terriers, collies, and the rest of my canine friends. It was not even affected by the recent and lively experience of the little black-and-tan who is barking beneath my window as I write. Yet the reason for this preferential treatment by my memory is clear to me. "Nick," who, until lately, has lived with me for years, is a black-and-white fox terrier, and though when the image arose it had no explicit reference to him it is he who has supplied the greatest contribution to it.

Moreover, in the generic image, colour is not the only feature which cannot be a mere compromise between experiences. Some other contributions to the image must be regarded as very heavily weighted. In fact it might be better to change our simile, as Dr. Maurice Nicoll has done,[1] and boldly to compare the generic image to a cartoon. The cartoonist usually represents in one picture the total effect of a whole series of impressions. Let us suppose that his aim is to depict in one single person a whole nation. He is surely not guided only by the majority of impressions received from numerous individuals. For how would this have caused the pre-war continental cartoonist to visualize the Englishman as a lanky soldier, clad in pill-box cap, mess-jacket and tight trousers, with a haggard face, projecting teeth, and a bull-dog pipe? If counting heads were the only process responsible for this, it is difficult to see how a tour through England or even the study of English tourists abroad would have led to this result.

The chief criterion in the cartoonist's selection of

[1] Op. cit. pp. 23 f.

characteristics to be represented is obviously their relevance to his main purpose. Compared with this, the frequency of their appearance is of little importance. But here we have our finger upon the guiding principle of the dream condensation. For it, such relevance is almost the only criterion of selection. To be sure, the dream goes farther than most cartoonists in completely freeing itself from any limitations of consistency or good taste; yet the fundamental principle underlying the generic image, the cartoon, and the dream is the same. They differ in that their degree of obedience to these canons is very different.

And, moreover, the dream mind pounces rapidly upon similarities between things; accepts and develops them in a way which is seen only occasionally in the waking personality. It may be that the comparative mono-ideism of the dream allows it to weave its fantasies unchecked, just as a creative artist works best when unburdened with domestic and business cares. But like the cartoonist, the dream achieves far more than the mere seeing of similarities. It uses his subtlest trick; if indeed the borrowing is not on the other side. By depicting a superficial, extrinsic similarity between two subjects it expresses in a veiled manner a deeper, more intimate likeness. The student of political cartoons will need no illustration of this.

So after all the dream condensation turns out to be an old acquaintance. In waking life his activities are so restricted that when we meet him in a region where his style is less cramped we may not recognize him at first. The visualizer, if he be honest, is likely to identify him more quickly than will the person whose image-apparatus is composed chiefly of sounds, muscular strains, and touches. For many a time he must have had a fleeting suspicion that the good story he has just

told is a shade more rounded-off than the actual experience which was its occasion; and that the putty which arrived so readily to plug the gap was another similar event from his past.

Our waking mind, however, occasionally throws up a condensation which is stamped on its face with its places of origin. Compared with the pictorial condensation, it possesses the inestimable advantage that the history of its origin is believed by others. Of such a kind are "portmanteau-words"; Siamese twins like "gratisfaction." Some of the factors in their making are easy to detect. They are the dead-heat of two thoughts racing for consciousness. Yet there is more than this in the manner of their birth; the different portmanteaus are visibly packed to various degrees of tightness. While "Bakerloo" means just what it says, the analysis of "anecdotage" would soon lead us into a magic lake around the edges of which psychologists, æstheticians, and even psycho-analysts can be seen swimming energetically, sorely tempted to say rude things to each other when they pass. At its bottom there lie the keys to the problem of Wit. Few have ever touched them, even momentarily; and perhaps it is as well.

Let us now inquire further why the dream work deals so frequently in these superficial, extrinsic links between ideas, seizing upon the similarity of sound or of appearance in the images which carry them. As we have seen, Freud believes that such trivial and external associations veil and express deeply significant intrinsic connexions, the personal significance of which is resisted by the censorship. He writes:—

"The correct explanation for the predominance of the superficial association is the pressure of the censor, and

not the suppression of the end-presentations.[1] The superficial associations supplant the deep ones in the presentation whenever the censor renders the normal connective paths impassable. It is as if in a mountainous region a general interruption of traffic, e.g. an inundation, should render impassable the long and broad thoroughfares; traffic would then have to be maintained through inconvenient and steep footpaths otherwise used only by the hunter." [2]

Little need be said concerning the part played in waking life by dramatization. Many visualizers attempt the solution of almost all difficulties which require forethought by picturing different actions and their results. The customary use of *oratio directa* by simple persons, when recounting their social adventures, clearly expresses the inner dramatization, employing audito-motor imagery. The chief difference between dramatization in the visual dream and in waking life is that in the dream the actors have the choice of many more trappings to wear in a play which has been passed by a negligent censor.

It is conceivable that secondary elaboration is only the customary manner of interpreting any object or thought which has been imperfectly apprehended. Numerous examples of it are well known both in perception and in memory. Every author knows the difficulty of discovering minor mistakes in his own proofs, for his own knowledge of the meaning of the words may carry him over gaps and blind him to printer's errors. The experimental investigation of the mental processes involved in reading demonstrates this subjective supplementation and correction. For example, it is not

[1] Perhaps a more helpful translation would be "guiding ideas."
[2] "The Interpretation of Dreams," p. 420.

essential that one shall see clearly all the constituent parts of a word before it can be recognized; the sight of its faint outlines is usually sufficient.[1]

The effect of these subjective influences is evident in the description of a picture which has been exhibited for a very short time.[2] If the picture on a lantern slide be projected on a screen for one-thirtieth of a second, and the observer be asked to describe what he has seen, most of the features of secondary elaboration are discoverable in his reports. This is of course especially noticeable if the picture is of something which is unfamiliar. One of Frank Smith's slides represented

> A Brittany bed, consisting of a richly carved cupboard containing two beds, one above the other. The doors slide apart and are open. Kneeling on a ledge by the upper bed is a woman in the costume of a Brittany peasant, and there is some one sleeping in the lower bed. Outside the cabinet is a carved settee.

Different persons interpreted this picture in various ways, but apparently they all assumed that it could be described as resembling something in their everyday experience. The following are some of the accounts given :—

> It looked like the balcony of a window and somebody standing on it.
>
> Something like the frontage of the laboratory, but much

[1] Cf. Goldscheider and G. E. Müller, "Zur Physiologie und Pathologie des Lesens," "Zeitschrift für klinische Medizin," xxiii. p. 131; Zeitler, "Tachistoskopische Versuche über das Lesen"; W. Wundt's "Philosophische Studien," xvi. 3, pp. 380-463; E. B. Huey, "Psychology and Pedagogy of Reading"; Bibliography in P. Sandiford, "Mental and Physical Life of School Children." London, 1913, p. 322.

[2] Cf. F. Smith, "An Experimental Investigation of Perception," "British Journal of Psychology," 1914, vi. pp. 321-62.

more pretentious. I was not aware of any interval between the sensation and the interpretation.

Like a glass case, standing in a sort of trough.

Another picture was entirely meaningless :—

A chaos made by a few blots of ink. To the left are a few straight lines which suggest a box or small hut, but the rest is without meaning.

The following answers show how inveterate is the tendency to read meaning into such an experience :—

It might be a lot of rapiers and boxing-gloves ; the paraphernalia of a gymnast.

Some ducks walking about on land.

A picture of St. George and the Dragon.

Like a cartoon in "Punch."

A boy on a donkey's back, and some more children standing at the side.

It should be emphasized that these descriptions came from adults as well as from children. It is therefore instructive to compare them with some accounts of the second picture which were given by boys from a grammar school which is well known for its adoption of modern methods of teaching and for its educational experiments. In this school the investigator found the spirit of independence to be more marked than in the other schools from which his subjects were drawn :—

A whole lot of jumbled figures with a box in the middle. Done in blue ink. All dancing round a box. Little ink smudges.

A pattern isn't it? Blue colour.

Like a landscape puzzle. Green colour.

I don't know what it is. Blue things. Might be Japanese writing. It goes in all directions.

It is clear, then, that in perception the influence of omission and supplementation may be so great as to

make several descriptions of the same complex object entirely different from each other. Errors showing the influence of the same processes can be easily demonstrated in testimony experiments, in which the subjects are asked to report a complex event.[1]

In the light of these facts the potent influence of secondary elaboration upon the memory of the dream can be easily imagined. Any attempt to describe even from immediate memory a collection of memory-images is beset with difficulties and pitfalls. Small wonder, then, that the accurate description of a dream, in which the images often appear with unfamiliar meanings, is possible only to a trained observer, and that even his account must be regarded as only approximately correct. But when, as is often the case, the dreamer relates his dream some hours after awaking, the effect of secondary elaboration must be very considerable.

This mechanism, then, is characteristic of most of the mental processes of waking life, though the results of its action upon dream events are even more striking than those which have been recognized in the investigations of perception and testimony. Other phenomena which allow its action to be studied with unusual ease are the rumour [2] and the "rationalization." [3]

The dream, therefore, appears to be a mental structure the constituent mechanisms of which are not

[1] Cf. T. H. Pear and S. Wyatt, "The Testimony of Normal and Mentally Deficient Children," "British Journal of Psychology," 1914, vi. pp. 387-419.

[2] Cf. C. G. Jung, "A Contribution to the Psychology of Rumour," "Analytical Psychology," 2nd edition. London, 1917, pp. 176-90; W. T. Waugh, "The Causes of the War in Current Tradition," "British Journal of Psychology," xi. 1920, pp. 159 f.

[3] Cf. Bernard Hart, "The Psychology of Rumour," "Proc. Roy. Soc. Med." 1916, ix. (Section of Psychiatry), pp. 1-23.

different in kind from those which characterize the mental events of waking life. It is the reciprocal interplay of these mechanisms, the altered emphasis which each of them receives, and their comparative freedom from the dominating directive tendencies of the daytime which combine to make the dream the *enfant terrible* of the well-ordered personality, and the delight of the modern psychologist.

CHAPTER VIII

THE ANALYSIS OF A DREAM

THIS dream, which the writer dreamt in July, 1913, attracted his attention on account of its profusion of detail; but especially because the diagrams which appear in it allow its general nature to be made more easily evident to others. It was recorded in writing immediately on awaking.[1]

Its analysis was carried out by tracing the dream material to its sources in waking life through the serial association method, when the mind was freed from all criticism or conscious guidance of the ideas which came to consciousness. It has been submitted to psychoanalysis by a second person trained in psychology, but no dream thoughts other than those discovered by the method of "free association" applied by the writer to himself,[2] were found.

In the account of this dream, which has woven itself around psychological matters connected with Dr. C. S. Myers, I am permitted by his kindness to use his name without alteration.

The Manifest Content.—*I was in St. Ann's Square, Manchester, early in the evening, in the summer. The light was curious; impossible to compare with any light effects*

[1] The following account was published in the "British Journal of Psychology," 1914, vi. pp. 281-303.

[2] See Freud, "The Interpretation of Dreams," p. 414. I studied my own dreams uninterruptedly for one and a half years. The following one was recorded during this period.

seen in waking hours. The whole square seemed to be one large arena (like the arenas used for bullfights), and people were crossing and re-crossing it. At one end of the square (the end opening into Market Street), in the right-hand corner, was a large cinematograph screen, showing moving pictures, and the impression in the dream (which seemed quite natural then), was that the square itself was one vast "picture-palace." I was then in position 1 *on Fig.* 1, *uncomfortably close to the screen; i.e. the pictures were not easily seen, and were distorted.*

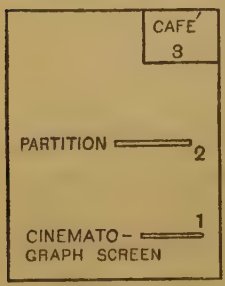

FIG. 1.

Suddenly I found myself in position 2 *in the square. The scene had narrowed down to the size of an ordinary room, about* 12 *feet square, though I could see no walls. The light was brighter, but not very bright, and I recognized it as coming from electric incandescent lamps. I was still in the square, yet people in evening dress were passing and re-passing me, through a partition like a screen (*2 *on map). It was, except for the feeling of not being "walled in," exactly like being at a University soirée,*[1] *for Professor and Mrs. S., in evening dress, passed through the partition and greeted me.*

I found myself then at position 3. *Here the light was dimmer, and I was sitting at a long form, amongst several other forms. People were eating and drinking, and the place seemed like a South German café. The "Gemütlichkeit" was very apparent to me. (This feeling-tone, and the eating and drinking, were the only "café signs," yet they were quite adequate to complete the perception of the place as a*

[1] The consciousness of the meaning of the scene was quite clear, although the "scenery" would not have suggested a soirée to anyone in the waking state.

café.[1]) *At once Dr. Myers walked into the café, sat down by me with a casual greeting, and took out several sheets of paper.* (*The impression was that we had both been working in the same laboratory, and had seen each other quite recently.*) *He began at once to explain to me that he was beginning a research on "physical and metaphysical logarithms."* (*The work was quite full of meaning and comprehensible to me at the time, and the problem seemed quite familiar.*) *His first paper contained complex algebraical problems in which two problems were worked out in very neat parallel lines,*[2] *in Dr. Myers's handwriting, side by*

FIG. 2.

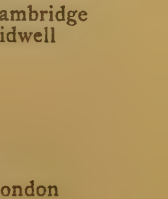

FIG. 3.

side, like the creditor-debtor columns in balance-sheets (*see Fig.* 2). *I cannot remember if I understood them. The reasoning did not seem difficult. Then he began to draw, on another sheet of paper, a map*[3] *to illustrate his remarks, which were, "You* (*meaning the dreamer*) *go down to London through* (*or from*) *Cambridge, and you get short-circuited at Bidwell, on account of the suffrage question." I quite understood this at the time. While he said this, a*

[1] Cf. footnote 1 on p. 120.

[2] These lines were longest at the top and gradually decreased in length. See Fig. 2. I sketched them immediately on awaking, but do not think I read them in the dream.

[3] The "map" was really a rough diagram which I have drawn as I saw it in the dream (see Fig. 3). The names did not appear on the "map," but I understood that they referred to the places marked on it.

man bent over both of us. He had the general appearance of a doctor (he wore a morning coat and dark trousers), but was unshaven, and this fact was very unpleasant to me. He kept on interrupting Dr. Myers and laughing at both of us. Dr. M. was quite friendly with him, but I was annoyed and irritated at the interruption.

(Awoke here.)

Sources of the Manifest Content

St. Ann's Square, Cinematograph.—Before going from Manchester to Cambridge, where I had stayed with Dr. M. on 13 July, ten days before the dream, two business visits had to be paid on the afternoon of the 12th, and the limited time available for them had caused some excitement and interest in the events. The first visit was to my tailor, whom I wanted to remind to send me a suit of clothes to take with me to Cambridge next day. The second visit was to see a sound-proof *partition* in a warehouse. This visit interested me greatly, as, if its sound-resisting qualities proved satisfactory, this type of partition would be erected in my laboratory. On my way between the warehouse and a return visit to the tailor's I met two men carrying an advertisement which announced that a *picture-palace* was offering free *refreshments* to its patrons. I had recently visited several picture-palaces, and had discussed them with my father.

The *cinematograph screen* in the dream occupies the same position in the *square* that my tailor's shop does in reality. (The advertisement and the tailor's shop were seen a few minutes after each other.) The actual screen and the unpleasant proximity of it are recollections from an experience on 29 June, when there were no seats available in a cinematograph theatre which my father and I visited, except some directly under the screen. The increased flicker and *the unusual angular*

appearance of the figures were irritating to us, especially as the pictures were interesting. I felt some responsibility for the inconvenience to my father, as I had suggested this particular theatre. There was some scientific interest to me in the fact of the increased flicker, and its connexion with the unusually great visual angle subtended by the pictures, also in the one-sided appearance of the flat human figures.

Why does the cinematograph screen appear in St. Ann's Square? In St. Peter's Square, Manchester (the only other square in the town which is named after a saint)[1], there is actually a *lantern screen*, upon which changing advertisements are *projected at night*. I have often waited for the tramcar here, and have found the pictures a welcome means of passing the time. We had waited in this way on coming from the cinematograph theatre described above. (See diagrams 6 and 7.)

The connexion of *cinematograph—tăilor—partition* will now be clear. In position 2 on the map of the "dream-square" the partition actually appears.

As it happens, the only other member of the staff who is erecting partitions of the same kind as my own, and in the same corridor as mine, is *Prof. S.* Also, the carpenter who was awaiting orders to proceed with my partitions had been entrusted with the task of making a *lantern screen* for me, to be fixed in the *partitioned corridor.*

Partition—Incandescent Electric Lamps.—I had been compelled to postpone giving orders to the electrician about the lighting of the partitioned corridor, owing to the rush on 13 July, although I had wished to do this before going to Cambridge.

Incandescent Electric Lamps—Soirée—Prof. S.—Bidwell. The last time that I had worked by electric light (the

[1] Though this statement in brackets is incorrect, it represents my belief at the time when these notes were written.

dream took place in the summer) was at a medical *soirée*, a few weeks before the dream. I had had some trouble with the *electric bulb* above my apparatus. This apparatus had been arranged in such a way as to leave room for an exhibit by *Prof. S.* The failure of the light, and its insufficiency when attended to, were annoying to me, because we were carrying out *Bidwell's* colour experiments, which need bright illumination. These demonstrations had excited much interest and questioning.

Lighted-up Partition—Refreshments.—The association given above (p. 122) partly accounts for this, but the laboratory used at the soirée (see above) opened into the *refreshment room*, into which we had gone when our experiments failed.[1]

Forms—Bidwell—Dr. Myers—Café.—Before leaving *Cambridge*, the last two subjects I had discussed with *Dr. Myers* (at *Cambridge* railway station) were the questions of *sound-proof partitions* and *the writings of Bidwell.* At *Cambridge*, too, another psychologist had spoken to Dr. M. of the habit of the *psychologists* at a *German* university at which we had both studied of *discussing, and working out, the results of their experiments in the café opposite the laboratory.* Not long before this dream (I believe, the day before), I had mentioned the same fact to my father. At that time I was working in a large room, and had arranged my books, including those dealing with *Bidwell's* work, on a table which was surrounded by *long forms.* This room would, for the next few weeks, represent my work. (Being a habitual visualizer, I frequently represent to myself a whole side of my activities by a visual image of one important thing connected with it).

The connexion between *Bidwell*, *refreshments*, and *café*

[1] In St. Ann's Square, in position 2 in Fig. 1, there is actually a café which at this time I used to visit frequently.

therefore seems obvious. There is, however, still another reason for their close association, which will appear at the end of this explanation.

Dr. Myers—Logarithms—Lines.—I had remarked to Dr. M. in our conversation at the station that there seemed to be a probability that a colour effect which Bidwell could not understand (reported in his paper in the "Proceedings" of the Royal Society), was simply the violet in "Fechner's colours." Professor S. Alexander has said more than once to me that there seems to be a more intimate connexion between Fechner's Law and the general nature of *logarithms* than has hitherto been supposed. He has also given me a typed sheet of manuscript which deals with the question, and in which there is mention of the "*physical-psychical* relation," and of the *metaphysical* concepts necessary in his treatment of the subject. I remember saying to him, "I think I understand it." The *lines* in Dr. M.'s MSS. seemed in the dream to be parallel, but the actual figures which formed them were not clear in the dream. The most striking feature on the paper was the fact that there were *parallel lines.*

The last time that *Dr. M.* was in the Manchester laboratory, when he was discussing the "*partition*" question with me, we discussed also the "Bidwell" work in connexion with the familiar phenomena of Benham's disc, in which black lines on a white ground (Fig. 4) appear coloured when the disc is slowly revolved. As I revolved the disc, he drew for me, on a sheet of paper, the lines of the top, writing by the side of them the colours that he saw. I was able to find the actual paper.[1] These lines, longest at the top and gradually decreasing in length, are just like the lines of the calculation seen in the dream. This paper was found

[1] Fig. 5 is a reproduction of it.

filed with those relating to the "Bidwell" work which lay on the table amongst the *long forms*.

FIG. 4.

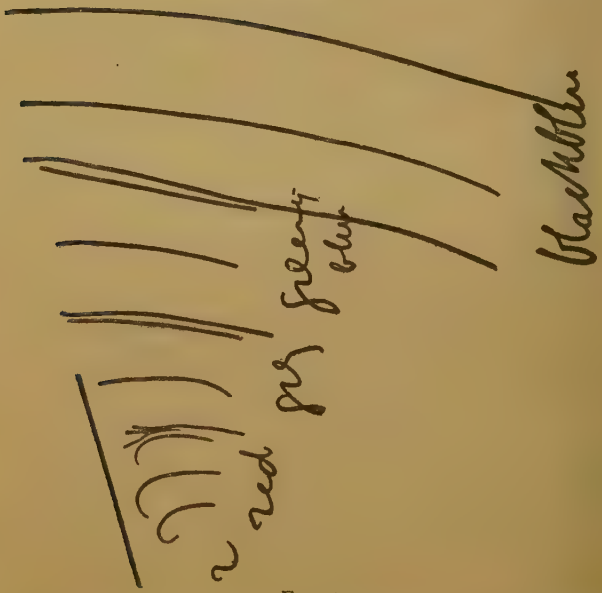

FIG. 5.

Cambridge—Bidwell—London—Suffrage.—A few days before the dream I had looked at the *road map* of the

route between Wisbech, in Cambridgeshire (near which town I was then staying), and *London via Cambridge*. I had noticed Great Shelford, where I had stayed with Dr. M., but the study of the map had taught me nothing new, and I had noticed the relative positions of Wisbech, Cambridge, and Shelford simply because they had interested me.

The last time that I had visited Dr. M. at Shelford was at a time when I had intended to *go to London* from Wisbech, and he had invited me to *take Cambridge* and Shelford *on the way*. Dr. M. had also said in my hearing, when he was at Professor Alexander's house, to a lady who had asked him about his views on the question of women's suffrage, "*You should come down to Cambridge*."

Until several hours after the dream the reason for the substitution of *Bidwell* for *Shelford* never occurred to me. I may have noticed before that Shelford Bidwell is the full name of the investigator who had occupied my thoughts, but Bidwell seemed, in the dream, to be quite the natural name of the village. The *position of Bidwell on the dream-map* was undoubtedly that of Shelford, for it was three or four miles south of Cambridge, or rather, in the terms of the dream, so many miles nearer London, on the way from Cambridge.

Short-circuited.—While, during my stay at Cambridge before the dream, I was asking a question about Benham's disc, an American colour investigator came into the room. He apologized for coming in late, and explained to us, "I've been side-tracked," meaning that he had lost his way. Americanisms in psychology being, owing to James's and Titchener's influence, especially interesting to me, I often use them in my own thinking, and the words "side-track" and "short-circuit" are frequently used in the same sentence when

dealing with the psychology of the thought processes, e.g. thoughts are "side-tracked" or "short-circuited." The American above had struck me at the time as being "*very* American," and I was amused at his use of the word "side-tracked."

The key to the whole dream, however, is given by

The Man who Interrupted.—He is not actually a doctor, but is intimately connected with medical work, and dresses just as he is dressed in the dream. He is very dark and clean-shaven, but I have never seen him unshaven, though his chin is very dark. The dark chin has become, in the dream, an unshaven chin. The smile he wore in the dream is the one which is, in actual fact, a distinctive feature of him.

The Man who Interrupted—the German Café.—See the interpretation of the dream.

The interpretation of the dream seems to me to be conditioned by the following facts. Before going to sleep, and during the day before the dream, I had been planning my work for the Long Vacation. This work, as I had been thinking about it, was represented visually by an image of the work table spread with books and files. (I often use such an image as a "scheme" in thinking; cf. the map in the dream.) My immediate interests were in the colour work (i.e. the "Bidwell" work), on which I wanted to begin at once (partly because brilliant sunshine was available at the time), and for which I had prepared some apparatus. But on the day before the dream[1] I had made a decision to leave this work alone for a time, and to begin to attack a problem concerned with Memory. The reason for this was that I had recently been asked for advice on this point by the "*medical*" *man* in the dream. In fulfilment of a promise I had made him (made after the

[1] This day is usually termed the dream-day.

necessary work had been planned with him over a *German* dinner in the *German restaurant* of the Midland Hotel, Manchester, which occupies the same position in St. Peter's Square (the square which actually contains the lantern screen) as that of my café in the dream-square (cf. Figs. 1 and 7)), I had decided to begin the "Memory" work before the "Bidwell" work. The data for this memory work I had obtained from this man who, in the dream, "kept on interrupting" Dr. M. These data actually lie in the memory file on one side of my work table, Dr. M.'s data in the "Bidwell" file on the other.

The meaning of the dream seems to be clear. On the dream-day I had actually decided (finally, as I supposed) to shelve the "Bidwell" work, although my mind was full of it, and to attack the "Memory" work at once, because of my promise. The dream throws valuable light on the striving of impulses which may still go on, even after an apparently final decision has been arrived at in waking consciousness. In the waking state the conflict was brief, and apparently decisive. The dream re-opens it in a characteristically vivid manner.

It is in a dream of such richness and complexity as this that one may fairly seek for confirmation or negation of the existence of Freud's alleged dream mechanisms—those processes which combine to form what he calls the dream-work—the distortion of the latent content into the manifest content. Let us, therefore, carefully examine the material of the above dream.

In the first place, the dramatization in this case is well-nigh perfect. The dream turns this mental conflict, which in a waking state would have been one of mere thought accompanied no doubt by some imagery, into a kind of problem play, in which the two opposed

influences become human beings. In the dream, the attractive "Bidwell" work is represented—for the many reasons given above—by Dr. M.; the less attractive but urgent "memory" work by the man who "keeps on interrupting" him. My thoughts of the "Bidwell" work on the dream-day had been continually interrupted by the thoughts of the "memory" work, until I had put an end to this state of things by deciding to postpone the former work. In the dream I am annoyed and irritated by the *representative* of the "memory" work, who persists in interrupting the *representative* of the "Bidwell" work.

It should be noted that in the dream I am not irritated at the real cause for annoyance, viz. the work which I have promised to do, but at the man to whom I have given my promise—a man with whom I have always been on friendly terms. Moreover, the dream seizes upon one harmless feature of the man—his dark chin—to transform it into a feature which is very unpleasant to me—an unshaven chin. Freud's assertion that the emotional tone which is attached to a thought in the latent content appears in the dream attached to another related element which is not under the ban of the censure, must be considered in connexion with this feature of the dream. It is quite true that professional and scientific interests would oppose, in waking life, a strong resistance to the temptation, which probably arose here, to consider the work itself as irritating. As a matter of fact, the work was very interesting to me, but the fact that my mind was full of the newer problem had been sufficient to displace it temporarily from the focus of my interest. Here the emotional tone seems to be displaced from the work to the man, and in particular to one feature of him.

The condensation employed in fashioning the "stage"

and the " scenery " of this dream is clearly visible. The most striking case is that in which the two squares, the four restaurants,[1] the two lantern screens, and the two laboratories fuse to form the scene of the events. (A comparison of Figs. 6 and 7 [2] with Fig. 1 shows this clearly.) The manuscript paper is a fusion of two papers, and the speech is a clear condensation.

ST. ANN'S SQUARE

Fig. 6.

ST. PETER'S SQUARE

Fig. 7.

The kind of superficial association involved in the play on words in the names Shelford and Bidwell, utilizing a coincidence, is again a very common factor in the dream-work of Freud's theory.

[1] The German restaurant at the Midland Hotel, the café in S. Germany, the café in St. Ann's Square, and the refreshment room at the soirée.

[2] Actual plans of the relevant details in St. Ann's Square and St. Peter's Square respectively with their positions.

It seems undoubtedly true, then, that several of the processes which, according to Freud, are characteristic of the dream-work, are illustrated in this dream.

What, then, can we regard as the *meaning* of the above dream? We may, I think, fairly describe it as the dramatic representation of a mental conflict in which the opposed conative tendencies at work appear in disguised forms. We must note, however, that I awoke before I was able to see if the interrupter was completely successful. And here we may ask, "What of the wish theory?" It may be that my wish to pursue the interesting work was actually being fulfilled in the dream when the waking consciousness, gradually regaining its power, introduced the counter-thought of my promise, and that this, depicting itself as dramatically as the first thought, appeared as the "man who interrupted." In connexion with this it must be remembered that it was only at the end of the dream, just before I awoke, that he appeared. I was able to find no cause for my awaking, such as a noise or a sudden change of illumination. It should be noted, too, that the partition, lighted up with incandescent lamps, represents the state of affairs as I should wish it to be, and that at the soirée in the dream the lamps are efficient, while in the event which caused this dream episode they were unsatisfactory.

The phrase, "you get short-circuited at Bidwell" is interesting. First, it strings together the words from several experiences to form a new sentence, and is obviously a condensation; secondly, it expresses in a figurative way the new direction given to my thoughts by the "Bidwell" work. It seems possible that this expression contains the incipient form of what in a more highly developed state might have been a combination of two rather cheap forms of wit—the play on words

in using Bidwell for Shelford, and the use of an actually heard phrase in a new way.[1]

Another fact in connexion with this might be mentioned here, viz. that Freud's theory of the short-circuiting or side-tracking of emotional interests was known to me through American writers at the time when I dreamt this dream. I do not wish to assert that I believe strongly that the sentence expresses more than the "short-circuiting" of my thoughts by the "Bidwell" work, but the completion of the sentence should be noted—"on account of the suffrage question." It should be remembered that one of the chief arguments used by the opponents of Women's Suffrage is that they believe that some specifically feminine interests may be "short-circuited on account of the suffrage" should women take too intense an interest in public affairs. The existence of this argument was well known to me at this period, and the psychological aspect of this controversy was at that time for several reasons frequently in my thoughts. But this possible interpretation occurred to me at a time much later than that at which I analysed the dream, so that I wish it to be considered quite separately from the facts given above. I have no proof that such a thought entered into the composition of the dream, but from a consideration of my special interests at the time of the dream, I am inclined to think it probable.

[1] Cf. Freud, "Wit and its Relation to the Unconscious."

CHAPTER IX

HOW WE FORGET

A CHARACTERISTIC mark of the psychology of to-day is the shift of accent which has come about in the attack upon the problem of memory. In the latter part of the nineteenth century the task of the psychologist seemed to be to discover how we can remember. For workers nowadays this goal is supplemented—supplanted, maybe, for some—by the equally interesting one of explaining how, once we have had an experience, we can ever forget it.

The older psychology, with its emphasis upon the cognitive or intellectual aspect of mind, influenced in many ways by the attraction of the newly founded experimental methods, and perhaps, too, by the natural desire, by means of them to produce results of obvious and immediate utility, focussed its attention upon problems connected with increasing the efficacy of remembering. By many psychologists learning was regarded as merely a process of forming associations between ideas; recall as nothing but the efficient use of such associations. Forgetting, then, quite comprehensibly, was interpreted as due to a diminution of the strength of such associations or to their complete cessation. And so in those days it was possible to regard the significance of the "curves of forgetting" which

characterized the pioneer work of Professor Hermann Ebbinghaus in the eighties of the last century,[1] as comparable to that of the apparently similar curves illustrating such phenomena as Newton's law of cooling, contained in textbooks of physics.

In such early experiments the material chosen to be learnt was deliberately squeezed dry of almost all possible meaning. It usually consisted of nonsense syllables, i.e. of "words" such as *bef*, *wol*, *fap*, which were unlikely to suggest any meaning to the ordinary reader. The reason for such exclusion of meaning was an excellent one. In this way, differences inherent in the present interests and the past experience of individual subjects were minimized as far as possible. The difficulty of learning any series of ten syllables might therefore be assumed equal to that of learning any other equally long series of syllables. Such investigations have resulted in valuable knowledge concerning some of the laws governing the economy and training of the memory for relatively meaningless matter.

Since this exclusion of meaning from the experimental material was deliberate, we cannot quarrel with the experiments because they threw, as they did, a comparatively feeble light upon the ways in which we normally remember a complex past event. For most of the experiences which we recall not only oozed meaning from every pore, but also were by no means free from affective tincture. Few of Ebbinghaus's investigations will help us to understand the manifold processes which have resulted in our present memory of that morning, when with smiling face and shivering inside, we first left home for boarding-school, or of that

[1] "Memory," translated by Ruger and Bussenius. New York, 1913.

tremendous moment when we became quite certain that we were in love. Indeed, of the results of these laboratory researches, M. Bergson roundly declares that they do not belong to the realm of memory at all, but merely exhibit the peculiarities of motor habit. For him such motor habit is only one of the forms in which the past exists in us; the other being that of independent recollections.[1] To the consideration of these independent recollections the greater part of this chapter—indeed, of this book—is devoted.

Since the early experiments on the "economy of memory" excluded the factor of personal meaning, it is clear that the nature of their material naturally preserved the learner from any violently emotional experiences, quite apart from the tranquillizing effect which the placid surroundings of the laboratory, when they became familiar, might have been expected to produce in him. If we except such work as that of Binet, Stern, and others upon the psychology of testimony, and a few tentative experiments here and there upon the relation between memory and affective experience, it is fair to say that most of the memorizing done under experimental conditions at that time was strictly intellectual in its nature. So it is easy to understand that at the beginning of the present century, the answer of the experimentalists to the question "What are the chief factors which bring about the recall of a past experience?" would have been, "Other things being equal, its vividness or emphasis in consciousness, the frequency of its occurrence, its recency, and the position, temporal or spatial, which it occupied in a series of such experiences."[2]

[1] "Matter and Memory," translated by Paul and Palmer. London, 1911.

[2] Very valuable practical lessons have resulted from experi-

But this proviso effectually divides the field in which these statements are true from one of the most interesting sections of the province of memory; that in which other things, emphatically, are *not* equal; in which the operation of these general laws is resisted by factors definitely attributable to the past experience and present mental make-up of the individual. Following the methods of the physical scientists, exactness, or a close approach to it, was purchased by rigidly excluding from the phenomena to be measured most of those components which made them everyday and natural. Hence the curves, distinctly useful in their own sphere; helpful in suggesting further problems but, perhaps—if so near to the past events, one may dare to attempt a historical survey—causing many to be incapable of seeing the trees for the wood. Since that time, however, some individual trees have been carefully examined, and by workers with diverse aims. Among these the names of Binet, Külpe, Stern, and Freud are honoured. It may be that scientists debate amongst themselves the relative value, for botany, of tree physiology and tree pathology: if so, the psychologist will listen to them with interest, for their problem is not unimportant in his own science.

Since, then, it is clear that in the remembering of complex personal experiences as distinguished from the "memory" of nonsense syllables, or of the multiplication table, other things *are* unequal, is it possible to find some term which will connote the varied factors bringing about this inequality? *Relevance* suggests

ments on such learning. They have been expressed very clearly and simply by Dr. Henry J. Watt in "The Economy and Training of Memory." London, 1915. Cf. also E. Meumann, "The Psychology of Learning," English translation by J. W. Baird. London, 1913; M. F. Washburn, op. cit.

itself, and its claims to this title may profitably be examined.

Relevance, looked at from the subjective standpoint, "from the inside," may be described as mental acceptability. Relevant memories are those which consciousness at the moment admits and incorporates with its present experience. Such relevance may perhaps be regarded as falling into two classes; fitly described by the adjectives logical and affective.

Logical relevance needs little description. When one thinks logically, each thought as it arrives in consciousness is rigidly determined, in a manner easy to understand, by its antecedent thought. The pattern of mental sequences is simple, and in it one can plainly see connexions like those of cause and effect, superordination, subordination, and the rest. But even in the minds of philosophers these examples of pure, cold, logical thinking are probably not common, while for the average practical man such experiences are very rare. Of course the latter often arrives at conclusions which logic would have justified, but the road which his mind trod in reaching them is seldom a logical one. For him, and probably ninety-nine times out of a hundred, for the philosopher too, the kind of relevance which is displayed by the incoming thought is affective rather than logical; certain present experiences and certain memories consort together because, among other common properties, they share a compatibility with a certain emotion or mood. How, or why, this can be is an unsolved problem, but the fact remains that affective relevance is often more powerful than cognitive relevance; a particular emotion or mood will call up ideas which our intellect rejects as illogical, unacceptable, impertinent. And yet to our annoyance, discomfort or shame, they stay in our minds unbidden

and unwelcome. They are extreme instances of the kinds of past experience which owe their recall to personal and unique factors in the mental make-up of the individual.

Forgetting, as Studied by Normal Psychology and by Psycho-therapy Respectively. The older psychology, searching for general laws, paid comparatively little attention to individual characteristics, intending, no doubt, to return later to this part of its province. Working from precisely the opposite direction, however, was a band of psycho-therapists, whose interest was primarily in individual persons and only secondarily in the general laws of their behaviour. The result was that this ground has been ploughed from two sides, though not all its cultivators seem yet to be aware of each others' work. Yet even now, though in the middle of the field many furrows do not meet each other, and some are far from parallel, there is visible an increasing general pattern which encourages the belief that tidying-up is proceeding satisfactorily.

This difference in the starting-points taken by the two classes of investigators may be made clearer by examples illustrating the two types of forgetting which have been usually studied by the experimental psychologists and the psycho-analysts[1] respectively. To illustrate the first type, let us suppose that a man stays for a day or two in a dull hotel, in an unexciting town, and that during this time his mind is almost fully occupied with important business which he has come to transact there. It is quite conceivable that six months later, while knowing that the room which he occupied in the hotel must have had a number which he

[1] It should be unnecessary to mention that these two descriptions are not necessarily mutually exclusive.

occasionally saw, he will be unable to recall exactly either its component digits or their order. Such forgetting seems to be explicable along the orthodox lines of experimental psychology. It may be assumed that however unimpressive his room number may have been, if he had lived in the hotel for a month, and page-boys, seeking him, had shouted the number every day through the public rooms, he would now be in a position to remember it by virtue of the sheer frequency and—if he were a shy person—the vividness of the experience. Without such an emphasis upon the number it would tend to fade from memory, and its impermanence might be explained by the assumption that it had formed very few associations, and those of a weak nature, with other experiences.

Now, before 1900 such an explanation would have been accepted by many persons, though some of them might have commented that it exposed psychology to the old accusation of being a science which states obvious facts in technical terms. Anyhow, the forgetting itself would have usually been unquestioned. Most people, moreover, would have attributed it to a loss of association-strength, though to express this in plainer language as a decreased pulling-power between ideas, would have been less attractive to them. By others[1] the field of psychology would have been openly and frankly deserted for that of physiology, where hypotheses would have been constructed, some of them based upon a few rather slender facts, others upon

[1] Not by Ebbinghaus, who writes of the different metaphors which are held by some to express our ideas concerning the physical basis of memory—stored-up ideas, engraved images, well-beaten paths—"There is only one thing certain about these figures of speech, and that is that they are not suitable."—"Memory," p. 5.

mere assumptions lacking the approval of the physiologists themselves.

But while we speculate concerning the most satisfactory way of accounting for the loss in memory of this room number, we must not deny admittance to one disquieting, but important, thought. What if the number has never been forgotten at all? That, of course, is conceivable; some chance recollection of the door of the room, especially to a well-marked visualizer, might float the number-plate, with its details, into consciousness. Any urgent desirability of recollecting the number, as evidence, let us say, in a criminal trial, might bring about the success of some exceptionally strenuous effort at recollection. The extraordinary powers of hypnosis, bringing into consciousness minute details of past experience which their subject declares he had never clearly observed at the time, might, again, recall the number. The person might dream it, for the hypermnesia or super-recollection of dreams is notoriously great. Finally, it might drift unexpectedly into a chain of free-association, started either with or without the express intention to find it. All this we now know, but how perplexingly difficult it then becomes for us to say that we have *really* forgotten anything? If the hotel number be still recoverable, what of the nonsense syllable learnt ten years ago; what of the name of that casual travelling companion in the Penzance train the day before the Diamond Jubilee? These things have gone into our mental waste-paper basket; are we quite so sure as we were that some benevolent scavenger eventually carted them away to the refuse-destructor, or may they still lie silted up somewhere on the outskirts of our mind, ready to tumble on the floor of our consciousness if some mischance disarranges the pile?

Perhaps thoughts or hopes such as these prompt us to shake our heads at the suggestion that nothing is ever forgotten unless its material basis of retention; the corresponding part of the brain or nervous system, has been permanently destroyed. But the possibility must be admitted. Obviously any real attempt to prove that we never forget anything would inevitably involve a comparison of the amount which we *can* remember with that which we *ought* to be able to remember. And this latter amount could only be estimated by recalling it! So the question seems to elude ultimate answer. But the phenomena of ordinary recall, of dreams, of hypnosis, and of psycho-analysis make it extremely difficult to subscribe to the common-sense view of a past in which certain things are really beyond recall. On the other hand, the relative extents of our knowledge concerning the psychical facts and their neural bases makes it difficult to find any mental satisfaction in physiological theories which are based chiefly upon assumptions.

The second type of forgetting is that which originally attracted the attention of Freud, and caused him to formulate his theory of "slips of memory." It differs, at least in degree, from the first type in that it is often temporary, apparently capricious, and difficult to explain, and that it is usually concerned with subjects which in the ordinary way we should consider to be of some personal importance. Such forgetting, moreover, often occurs in us when we appear to others, and even, perhaps, to ourselves, to desire most earnestly to remember. *Per contra*, the item desired may reappear in memory at a time when we are apparently making no effort to bring it back. We may temporarily forget the name of a person well known to us, a person whose relations with us are far more intimate than those of

many of the casual acquaintances whose names we remember easily. The slip of memory, on the other hand, may affect an intention, and forgetting to carry it out at the time may lead to a great deal of subsequent inconvenience. To ascribe all such slips to cynical selfishness or indifference would be to neglect the fact that the unexecuted commission or the unposted letter may often necessitate the forgetter's making reparation for his slip at a time and place highly inconvenient to him. These and a host of examples of minor mental lapses have been described by Freud in his "Psycho-pathology of Everyday Life," [1] and by Ernest Jones in "Papers on Psycho-analysis," [2] where they are easily accessible to the student.

There are, of course, still more serious cases of forgetting, prominent amongst which are those losses of vast tracts of past experience which are observed in the functional *amnesias*. Such forgetting is now known to be due to an exclusion of experience from consciousness, and not to its complete and final loss.

If we may return to our gramophone analogy,[3] it is as if a crack in the record prevented the reproducing needle from travelling any farther. This injury is not irreparable. The needle can be rushed across the fissure by the application of force, it may be deliberately lifted across and dropped on the other side by some human agency, or the crack may be caused to disappear gradually. Possibly some such events take place when an amnesia is suddenly terminated by a violent emotional shock, when it is temporarily abrogated under hypnosis by a physician who knows the nature of the lost memory, and when it

[1] Translated by A. A. Brill. London, 1914.
[2] Second edition, London, 1918, chaps. iv. and v.
[3] Pp. 3-7.

ceases as the result of treatment which restores mental integration previously lost.

The Rôle of Repression in Forgetting. Considerations of such forgettings as these led Freud to enunciate his doctrine of *repression*. Repression he believes to be a defence mechanism, the biological function of which is to guard the mind against the intrusion of experiences which would cause it pain or discomfort. Such exclusion takes place with regard only to present circumstances and not to the future. Its function is to purchase comfort for the individual, even though it be paid for eventually at a high price. Such a process is active from our very earliest days. To it is attributed the amnesia for the first few years of life which all adult human beings exhibit, though (interestingly enough in the light of this theory) it seems to be accepted by most of them as natural and needing no explanation.

This mechanism of repression, though present in all minds, varies greatly not only in its efficacy, but also in the frequency with which it is brought into action. Moreover, repression is more often effective in the case of intimate private memories, the full details of which are known only to oneself, than to what might be termed quasi-public memories of past experiences, which, though personal, are known comparatively fully to others. Thus one would not expect the average person successfully to repress the memory of a bankruptcy or of the death of a beloved child. It is rather that certain intimate private fears, loves, hates, and ambitions conflicting with that highly organized system of sentiments which contribute to his self-regard[1] are not allowed fully to develop in his consciousness. The

[1] Cf. W. McDougall, "Introduction to Social Psychology." London.

repression may extend too, to memories which, if they were allowed to hold the focus of consciousness for long, would call up by association such banned experiences, though they themselves relate directly to unrepressed material.[1] Dr. Ernest Jones compares the fate of such memories to that of non-combatants who get in the line of fire.

In considering the relation of forgetting to repression one must take into account the significance of two social conventions which appear to be almost universal among modern civilized people. I refer first to the expectation and unquestioned assumption that a healthy person will "try to forget" a poignant grief or disappointment if it is irreparable. Now the various ways in which persons of different types attempt this task of forgetting are significant. The weakling may take to drink; a slightly stronger type may seek to encounter great danger or excitement; yet another may plunge himself deeply into the difficulties and stimulations of his work. But in every case, except that of the unfortunate who broods over the sorrow, there are undoubted signs of an attempt to achieve the same aim —the exclusion from consciousness of the painful memory.

Of this universally-acknowledged fact two different views may be taken. One is that such a temporary forgetting, which often ensues as a result of volitional behaviour of this kind, is a manifestation of psychical control, subconscious or unconscious, a process of active repression. The other view would be that it is unnecessary here to assume anything other or more than the "side-tracking" which any mental process necessarily must suffer when other, more intense, processes

[1] An example of such repression is given on pp. 149-51.

enter into competition with it. Owing to this competition the "side-tracked" memory fails to affect the mind with an intensity sufficient either to entitle it to a place in the focus of consciousness or to ensure for it a subsequent greater degree of retention than that which it possessed when it was so recalled into consciousness. But it seems undeniable that a memory which at any time has been so importunate as to necessitate the taking of active measures to drive it away cannot be said to have failed to reach a degree of intensity sufficient (other things being equal) to bring about its retention in the mind. Under ordinary circumstances we remember with the greatest ease many events which assuredly were never so intense in consciousness that they had to be expelled. The very fact that we have tried to drive a memory out of the mind may be taken as sufficient warrant that it has reached a high degree of intensity. Therefore the subsequent forgetting of the memory must be accounted for in some way which does not necessitate the assumption that there was insufficient vividness for the impression of the experience on the mind. On the whole, there seems to be good evidence for the existence, in mental affairs, of this process of repression.

The Relation of Repression to Attention.—Now, while it is clear that no psychologist has developed the idea of repression so fully as Freud, its beginnings at least have been visible in most modern descriptions of the phenomena of attention, both in the perception of actual objects present to our senses and in the recall of ideas. Perhaps the nature of repression may be more easily grasped by the reader if he considers for a moment some mental happenings simpler in nature than those which form the illustrations of most writings on repression.

It is obvious that at any time we may be *aware* with more or less clearness, of our *experience.* This may be illustrated by two examples. Let us suppose a lawn-tennis player to be watching intently the flight of the ball, in order to place it, on its return, in the desired region of his opponent's court. His consciousness of the ball is likely to be sharply focussed, while other experiences, the warmth of the sun, or the swoop of a passing swallow are certain—if he is a good player—to to be very much less clear. He is said to be *attending* to the ball ; and psychologists have long used the illustration of the lens, concentrating the rays of light which fall upon it into a brilliant focus, at the expense of the area around that focus, which, lighted dimly, is called the margin.

But attending *to* the ball in this way will almost certainly involve attending *away from* certain insistent parts of his experience such as a tight shoe or a blistered hand, and the clearer the ball becomes, the obscurer will be his experience of these marginal events. In other words, it is probable that the most elementary act of attention to a present experience involves a process simpler than but related to repression.

It is reasonable to suppose that this " attending away from " a mental object is just as important when the object of attention is not external and physically real but is a recalled idea. Indeed, it is already generally acknowledged that the association of ideas may be facilitated by creating a " constellation " which, in course of time, gives rise to images, ideas, or thoughts favourable to the emergence of the desired fact. When, for example, we experience difficulty in recollecting a person's name, we naturally try to bring into consciousness all those facts within our knowledge which are connected with the owner of that name. We may

endeavour to image his appearance, his house, his last conversation with us or the contents of the last letter he wrote. All this is so well known to every one that it scarcely merits consideration here. But if we admit the existence of such facilitation in the associative sphere, we may not be allowed to shut our eyes to the probable existence of the correlated antagonistic process, inhibition. When we adduce, as one of the factors in the attention process, the facilitation of relevant processes, we acknowledge at the same time the great importance of a simultaneous inhibition of irrelevant processes: we express this by saying that we shut our eyes or shut our ears to the calls of experiences which are not concerned with the one which, for the time, stands out in consciousness with maximal clearness.

One seems compelled, then, to regard facilitation and inhibition as different expressions of one and the same mechanism: any process which is facilitated will hold the central point of consciousness by virtue of the very fact that the other competitors are held back. Probably this is because there is competition for the available mental energy, which is limited in amount. Again, if when we prepare our minds for a given subject, the physiological explanation of the phenomenon lies in the "sub-arousal" of associative paths connected with relevant matters, may there not be an opposite process, which we might describe as shutting our minds to a subject, the nervous correlate of this being the "sub-inhibition" of paths concerned with ideas associated with this subject?

The famous quotation from James is inevitable here:—

> Now there are always some objects that for the time being *will not develop*. They simply *go out;* and to keep the mind upon anything related to them requires such incessantly

> renewed effort that the most resolute Will ere long gives out and lets its thoughts follow the more stimulating solicitations after it has withstood them for what length of time it can. There are topics known to every man from which he shies like a frightened horse, and which to get a glimpse of is to shun. Such are his ebbing assets to the spendthrift in full career. But why single out the spendthrift when to every man actuated by passion the thought of interests which negate the passion can hardly for more than a fleeting instant stay before the mind? It is like "momento mori" in the heyday of the pride of life. Nature rises at such suggestions, and excludes them from the view:—How long, O healthy reader, can you now continue thinking of your tomb?[1]

If, then, the existence of a temporary inhibition, occurring alongside the ordinary processes of facilitation, be granted, it seems reasonable to suppose the possibility of a semi-permanent inhibition. Such a mechanism is believed to operate when a memory is repressed, in order to avoid the "unpleasure"[2] which would be caused in the mind by its revival. Though many such cases have been given in psycho-analytic literature, I may, perhaps, be allowed to discuss in this connexion one of my own experiences.

In the analysis of a dream,[3] a striking example of forgetting the death of a close friend was encountered. Not only was the forgetting further illustrated, to the writer's utter astonishment, by a symptomatic action (beginning to write a postcard to the friend, some months after his death), but the dream there analysed seems—unless we regard its contents as mere nonsense,

[1] "Principles of Psychology." London, 1890, i. p. 421.

[2] This word is used to denote the exact opposite of "pleasure." Neither "pain" nor "displeasure" succeed completely in doing so.

[3] Reported in the "British Journal of Psychology," 1914, vi. pp. 288-92.

an attitude which the orderly structure of the dream does not justify—to be capable of only one interpretation, that the friend returns to a university post which he had held shortly before his sudden death. The reasons for the repression of such an intimate memory as the above have been given in the article quoted. However, the matter does not end here. In November, 1913, two years and four months after the death, two years and two months after the symptomatic action, and one year and four months after the dream, I was writing down a list of friends living abroad to whom I wished to send Christmas greetings. To my surprise, I could not recollect the name of a married couple whom I knew well, and who had only recently left England for Australia. Immediately I went over in my mind all the circumstances which connected me with them. The town in which they are now living (a town in which I know no other people) with the man's important and, in that locality, unique profession came at once into consciousness, and it was quite easy to pass in review the names of the comparatively small circle of our mutual friends. For some minutes, however, the desired name obstinately refused to appear. At last there came the name of this friend who is dead, and about whom I had the dream mentioned above. The next moment I was conscious of the name I was seeking, and I saw for the first time the great similarity between the two names. Both begin with the same letter, both names have two syllables, and all the four syllables contain the same vowel sound. Thus, to use a technical expression, they are associated extrinsically through similarity in sound; in a loose sense, they rhyme with each other. Further, the nine letters of the longer name contain all the six letters of the shorter and in almost the same order. There is thus ample cause for

the superficial external association of the names. But, over and above this, the two names are connected by the strongest of internal associative links. These two friends were introduced to me by the colleague who is represented in the dream : we often met in his company, and he often spoke of them to me. Most important of all, however, is the fact that it was to them that I wrote immediately on hearing the news of his death.

For these reasons the forgetting of this name seems to me to be beyond all possibility of explanation by "chance" or "inattention." I forgot no other names in compiling the list, a list which contained the names of people whom I knew far less intimately than those whose name was forgotten. My memory for names is in no way unusually weak. The intimate connexion of this forgetting with both the symptomatic action and the dream makes it almost impossible to avoid the conclusion that such a "slip of memory" is determined by unconscious factors.[1]

The second important social convention of which Freud reminds us is that society is unanimous in expecting that certain instructions and duties will *not* be forgotten. Punishment for forgetting such duties is usually considered to be just. He points out that, both in military service and in the service of ladies, failure to remember is considered to be synonymous with a not wanting to remember. This again indicates an almost general belief that forgetting is not entirely free from psychical control.

The Forgetting of Dreams. — In this connexion a phenomenon of special interest is the forgetting of dreams. To most people it is a familiar fact that a

[1] Cf. Dr. Ernest Jones's comments upon Dr. A. Wolf's interpretation of this incident, "Papers in Psycho-analysis," pp. 115-17.

dream which, on awaking, may be as vivid as, or more vivid than, any ordinary succession of images or memories in their waking life, frequently differs from these latter in one striking respect, that a very short time afterwards it is totally forgotten. Such a characteristic of dreams has been regarded by Dr. Morton Prince as forming "only a particular example of amnesia for dissociated states, such as abstraction, presleeping states, hysterical crises, trances, psycholeptic attacks, hypnosis, suggested post-hypnotic phenomena, etc."[1] To this, however, it may be objected, that even after a dream has been *recorded* it is frequently completely forgotten. Now the recording was not carried out in a dreaming but in a waking state. We might not, therefore, expect the recorded dream to be subject to any influences other than those which are operative in the case of ordinary material remembered during the waking life. But that this seems not to be the case was made very clear to me in the period of one and a half years during which I recorded every dream of which I was conscious on awaking. I often found that on awaking at the usual time in the morning I could remember that I had awakened during the night and had written down a dream. Frequently, however, I could not recall any details, or even the theme of it.

I admit that objection may be made to a description of the mental state in which one records a dream in the middle of the night as really *waking*. I am indebted, too, to Dr. Rivers for the important reminder that a house physician in a hospital may be aroused in the middle of the night, attend to a patient, even write a prescription, and on waking at the usual time in the morning forget temporarily that he has performed these

[1] "The Mechanism and Interpretation of Dreams," "Journal of Abnormal Psychology," 1910.

actions. But the forgetting of dreams is not confined to those which have been merely recorded or even partially analysed, either in the middle of the night or just before arising in the morning. It extends to dreams, the memories of which have been carefully considered hours after awaking; some of these memories, moreover, having been traced to their sources.

I have been accustomed to subject my recorded dreams to subsequent early analysis, and, for the purposes of later reference, following Freud's procedure, have given them titles which indicate their themes. When some months later I have met with a passage in my notes referring to one of these dreams by its descriptive title I have sometimes been unable to remember a single detail of it, although not long before I had spent some considerable time not only upon its record but upon its analysis.

An example of this might be mentioned here. In waking life my auditory imagery is very scanty and far from clear. I am therefore interested in the fact that occasionally in dreams it is much clearer and more vivid, and plays a far more important part in my consciousness than when I am awake. One dream, which I recorded in all its remembered details, but could not analyse completely, begins with a scene in which I hear an orchestra playing the *pianissimo* opening of Sibelius's "Valse Triste." This is a feat of imagery of which my waking life seems to be entirely incapable, and for that reason the dream was highly interesting to me, both from the personal and the professional aspect. A few months after recording the dream, and unsuccessfully attempting completely to account for or to interpret it, I read in my notes a reference to the "Valse Triste" dream, and could remember nothing of it, except that a dream with such a title appeared in

my collection. I even forgot the opening scene described above. It seems to me unlikely that if I had read in a book a story of similar length, had then written it down from memory, and had subsequently spent even an hour considering its details and theme, I should have forgotten it so completely, especially if it had interested me as much as this dream undoubtedly did. It is, I think, important to note the fact that this was a dream which had *resisted* analysis; the latent thoughts of which therefore were still unconscious. That the thoughts which give rise to a person's dreams are frequently of a nature unacceptable to him in waking life is, I think, a fact beyond dispute. It seems, therefore, not unreasonable to assume that some dreams are specially forgotten because of the unacceptable nature of the thoughts which lie behind them.

In studying Freud's general theory of forgetting one must acknowledge that the examples quoted in illustration produce very different degrees of satisfaction in one's mind. Some of the incidents appear to be quite satisfactorily explained, but in others the factors are traced in a far less convincing way. It must be granted, however, that associations which, to the reader, sound far-fetched, may have actually existed in the mind of the person in question. Some minds seem especially given to playing with superficial associations by similarity, of which the now unfashionable pun (a form of association indulged in rarely by some people, frequently by others) is only one example. This necessarily subjective side of such work will always remain a perplexing factor, which an increasing knowledge of the range of individual mental differences will only partially remove.

Dr. Rivers's Theory of Suppression and Repression.—A recent conception of the rôle played by repression in

forgetting, though difficult to describe briefly, is of such interest that it cannot be omitted. Dr. W. H. R. Rivers, in his book "Instinct and the Unconscious," going beyond the mere belief that repression may be a mechanism of biological utility, speculates boldly concerning its nature and the ways in which it may operate. It should be emphasized that repression is discussed by him exclusively from the positive standpoint, and not under that normative aspect which is almost inseparable from its consideration by psychotherapy or "common sense." For the latter, repression naturally appears, in certain cases, to be morbid, and—in so far as it possesses a conscious element—unwise, short-sighted or reprehensible. Rivers, however, views repression as a process which is indispensable, man being what he is, for the efficient working of the mind, and indeed of the body. Under certain circumstances it may lead to unfortunate results for any particular individual, but this fact obviously does not constitute an insoluble biological problem. Nature provides us with myriads of examples of mechanisms which, though broadly favourable to the majority, bear hardly upon individuals. Moreover, like the breakdown of a machine or of a society, the failure of adjustment to environment which may occur under the influence of imperfect or exclusive repression, often reveals more clearly the nature and relations of the constituent elements in the adjusting mechanism.

A fundamentally important point to be grasped in Rivers's exposition is the distinction which he draws between what he calls Suppression on the one hand, and Repression on the other. The term Repression is applied by him to processes which form only a part, and that the least important part, of that group which Freud designates by this word. For Rivers, repression

is one's "witting" endeavour to banish experience from consciousness; suppression the means by which experience becomes unconscious. However, this becoming-unconscious of experience is not the only result attributed to the activity of suppression. In most cases, he believes, suppression occurs unwittingly; witting repression being followed by suppression only when conditions of some other kind favourable to suppression are present. Such a conception is helpful in answering the common and usually instantaneous objection to any simple statement of the theory of active forgetting; why, when we try to forget something, do we usually fail?[1]

This treatment of suppression is of particular interest in that it displays a feature somewhat rare in writings which have been influenced by psycho-analysis; the tendency to seek for physiological explanations of the phenomena described. In the present instance the material for these explanations has been drawn from the observations, now classical, of the sensory effects of dividing certain nerves in the human being and of allowing them subsequently to reunite.[2]

These experimental results, and their descriptive terminology, are pivotal to much of Rivers's argument. He claims that when, after operation, epicritic cutaneous sensibility returns, the earlier protopathic sensibility does not persist unaltered side by side with the later development, but that certain of its characters fuse or blend with the epicritic, while others are not only sup-

[1] It has been pointed out before that it is the intimate, personal memories; those known only to oneself, and not to the outer world of society, which are the more likely to suffer forgetting of the kind which Freud has made his special study.

[2] The reader is requested, before beginning the next paragraph, to study pp. 232-33.

pressed, but—this is the important point—they persist in a latent form, ready to come again into consciousness if the appropriate conditions are present. That is to say, Freud's conception of the unconscious finds its physiological parallels even at the sensory level.

Rivers then passes on to the work of Drs. Head and Gordon Holmes, who discovered, between 1911 and 1912, a relation between the cerebral cortex and the optic thalamus very similar to that existing between protopathic and epicritic sensibility. When the cortex cerebri is put out of action, by injury or otherwise, stimulation of the skin produces sensations the very marked pleasantness or unpleasantness of which is quite disproportionate to the intensity of the stimulus which called them forth. They may be described as affectively over-weighted. Moreover, while under ordinary conditions such sensory experiences would appear to come from an external object which "caused" them; in this lamed condition of the nervous system such an objective character is absent from the experiences. Both these new attributes, affective over-weighting and absence of objective character, are very similar to those characterizing the experiences of protopathic sensibility. In normal circumstances, Rivers believes, this tendency to affective over-response, attributable to the thalamus, is suppressed by the cortex.

It is, however, the recent work of Drs. Head and G. Riddoch which suggests the most impressive confirmation of the theory of suppression. In 1918, their observations of a number of patients in whom the spinal cord had been completely divided enabled them to examine the functions of the lower end of the cord when isolated from the rest of the nervous system. The diffused and generalized "mass-reflex" which they discovered (a reflex possessing characters quite unknown

when the nervous system is intact—with its generalized character, its absence of discrimination and localization, its strong suggestion of a mechanism adapted originally to remove the whole rather than a part of the animal from noxious stimulation) is considered by Rivers to have suffered, in the normal human being, complete suppression in favour of reflexes delicately graduated according to the locality and, to some extent, according to the nature of the stimulus. This method of reaction he believes to have lain hidden in man, as a potentiality which is scarcely ever realized; as a living embodiment of an earlier phase of history. In the history of *the* man or of Man? Rivers inclines to the latter view.

> In this case, and in the case of protopathic sensibility, we are not dealing with the suppression of individual experience, but with the suppression in the race of experience belonging to the earlier phases of its history. Through a special experimental procedure, or through accidents of war, it has been possible to follow the suppression of this experience in the individual. The fact that this is possible suggests that the racial suppression is repeated in every individual as part of the recapitulation of the racial history. If this be so, however, the suppression takes place at so early an age that its detection is impossible. It would never have been suspected if the experiment and the clinical observations of Head had not pointed the way thereto.

Suppression, then, is exhibited as a process which may take place on the sensori-motor, the reflex or the highest levels, and the "becoming-unconscious" of experience is merely a special variety of the process of inhibition, common to every phase of animal activity. But the relation of lower to higher performance in the nervous system is carried still farther. Just as on the sensori-motor level certain elements of protopathic experience are utilized by the process of fusion while

others are suppressed, so, it is suggested, two kinds of elements in the unconscious may be distinguished :—

> Corresponding with this distinction two kinds of elements in the unconscious might be recognized—those which have only disappeared from consciousness in their original form, but continue to exist in the different form they have assumed through the process of fusion, and those whose disappearance has been more complete so that they do not enter into consciousness even in an altered form under normal conditions, though their continued existence is shown by their reappearance under peculiar conditions such as those which accompany the regeneration of a divided and reunited nerve.

Rivers therefore believes that certain experiences of our past are utilized by the personality, fusing with others acquired later, while experiences and modes of behaviour which are incompatible with these later developments are suppressed. To this second class only, "to those earlier forms of mental activity and mental experience which have not been capable of utilization by the process of fusion, but have required the more drastic measure of suppression," to the exiles in the mind's Siberia, does he propose to apply the adjective "unconscious."

There is much that is attractive and helpful in this conception of fusion, of elements integrated into men's present experience. Yet one question still remains unanswered : what kinds of experience become fused ? If we suppose that the compatible, the dull, the inoffensive in our past subside into a compact, undifferentiated mass ; that the numbers of our tram-car tickets, of our hotel rooms, the details of our everyday meals, of our casual conversation fuse into a grey solid slab of background and are thenceforth inextricable as individual experiences ; how do we account for the surprising way in which we occasionally encounter them years later in

dreams, or for the hypnotist's power of dragging up and apparently saving from oblivion the minute details of a recent experience? The reply may be made, and possibly with justification, that this is evidence that such recallable material was *not* fused, and that for every item so dredged up there are thousands which lie for ever at the bottom; unable under any circumstances to rise again because they have lost their individuality; that the fact that any part of our past appears in a dream is strongly suggestive that it is not of a fusible character. But it all takes us farther and farther away from those calm early days of pioneer work with nonsense-syllables, and inclines us regretfully to search for some other name for the "curves of forgetting."

The reader will remember the view that these graphs portray only certain special examples of the decay or fading of muscular habits, that what was "forgotten" in the phenomena upon which these observations were made was merely the habit of the speech-mechanism, and that *real* memory, the coming into consciousness of independent recollections, may obey laws quite different and less easily discovered. Whether this be a justifiable view or not, one's degree of success in finding verbal garments for a memory is likely to be but a poor measure of its permanence, its readiness or its personal significance. It is just here that the problem of the "meaning of meaning,"[1] the importance of which is so variously estimated by contemporary philosophers, becomes unusually insistent.

To return to Rivers's theory. He believes that past

[1] Cf. the symposium on this subject, by Dr. F. C. S. Schiller, Mr. Bertrand Russell, and Mr. H. H. Joachim. "Mind," xxix. N.S. off-print No. 116, and Dr. Henry Head's paper on "Disorders of Symbolic Thinking and Expression," "British Journal of Psychology," 1921, xi. pp. 179-93.

experiences are dealt with in two ways: by the normal method of fusion and, perhaps, the less advantageous one of suppression. These suggestions, however, are themselves based upon analogies with the interpretations placed upon the physiological findings which are mentioned on pages 156-58 and 232-33; interpretations the validity of which is not granted by all physiologists. To discuss this part of the subject is completely beyond the powers of the present writer.[1]

But the part of Rivers's speculations which demands the most careful thought—all the more careful because of its inherent fascination—is a suggestion that the result of any injury to a formerly intact nervous system is or represents a past phase in the development—racial, individual, or both—of that system. Dr. C. S. Myers has pointed out that if "owing to some nervous lesion a man develops a new gait, we cannot assume that this gait represents a more primitive form of progression."[2] So, it may be argued, the appearance of an unusual mental state when a breakdown of higher control occurs cannot be regarded as proof that this state represents a primitive phase either in man's ancestry or in the individual history of the patient himself.

Rivers's speculation, however, is a timely reminder that in the last twenty years' publications on the many aspects of the mighty problem of personality far more has been written of stones which the builders rejected than of those which naturally and directly became the

[1] A general review, by J. T. Metcalf, of the work between 1911 and 1920 upon the cutaneous and kinæsthetic senses ("Psychological Bulletin," 1921, xviii. 4, 181-202), summarizes and gives references to recent attempts by Boring, Carr, Trotter and Davies, von Frey, Hacker, Pollock, and others to evaluate Head's theory of cutaneous sensibility. Dr. Head comments upon some of these writings in "Studies in Neurology."

[2] "Discovery," November, 1920, p. 339.

heads of the corners; far more of mental breakdown than of mental integration. The time is ripe for an increase in the number of students of these more homely problems.

Since Rivers did not work out the application of suppression and fusion to the problems of memory, criticism is impossible. At present, however, it would seem that in so far as these conceptions apply to the nervous system, they relate to a couple of alternative conditions, while the facts of memory suggest that if these conceptions are to prove adequate as working bases in this field they should rather represent extreme cases linked up by an infinite number of transitions. Between the outlaw who lives entirely independent of the rest of society and the peaceably-minded civil servant who has become completely assimilated in it, there are obviously all kinds of intermediate persons. Somewhere in the social ladder joining Limehouse to the most correct London suburb, Letchworth and Chelsea must be fitted in, though perhaps few would dare to define their relative positions. So it seems to be with the experience which is banned from consciousness and that which is so commonplace that it is forgotten; the difference between them may be one of degree, great though it is, and Dr. Ernest Jones's belief that all forgetting is due, in part at least, to repression[1] amazes fewer people now than it did when he first avowed it.

A Suggested Classification of Different Kinds of Forgetting.—In a paper on "The Rôle of Repression in Forgetting," written in 1914,[2] I drew a distinction between two kinds of forgetting; a distinction which was subsequently characterized by Dr. Ernest Jones as

[1] "Papers on Psycho-analysis," p. 109.

[2] "British Journal of Psychology," 1914, vii. pp. 139-46.

holding between the forgetting of the insignificant and the forgetting of the significant. I believe that this way of describing the facts is a first approximation to correctness, though most psychologists nowadays are very chary of asserting that any fact in their own experience —to say nothing of other people's—can be confidently termed insignificant.

The kinds of forgetting which were then distinguished have been exemplified on pages 139 and 142. Two brief examples may be given here to refresh the reader's memory. A year ago to-day, let us say, after a dull and solitary lunch in his usual restaurant, a man mentioned, as he does every day, the number of his cloakroom ticket to the attendant. He has now forgotten both the details of the lunch and the number. These are forgettings of the first type. But let us suppose that he forgets to post an important letter, forgets the name of a good friend, or, though a highly moral person, forgets to carry out a promise. Whether or not the first examples are of insignificant things, it is certain that these last are significant.

Is there any good reason for attributing these two kinds of forgetting to different causes? Let us take the second type—the forgetting of the significant—first. While allowing that inattention to these things, caused by the occupation of the mind with other matters, may account for some of these happenings, it is impossible to shut one's eyes to the fact that one more often forgets to carry out other people's commissions than one's own, boring subjects more often than interesting ones, and so on.

These facts seem to be explicable in no way other than by admitting some hypothesis of active repression. The former type of forgetting I conceived provisionally in the paper already quoted as conditioned almost or

quite exclusively by physiological factors. Forgetting of this kind might be due to a progressively decreasing capacity of the brain to retain an impression after it had been experienced; to a kind of physical decay of which Ebbinghaus's curve of the forgetting of nonsense syllables might be diagrammatic evidence.

Since then, Dr. T. Brailsford Robertson has attempted, on such a principle, a physiological explanation of forgetting.[1] He conceives that the fatigue- or waste-products generated in the neurones by stimulation accumulate and act as auto-catalysors. Forgetting he conceives to be due to the fatigue-products being slowly washed out of the neurones by fluids which circulate through the nerve elements. On the basis of the similarity between certain curves representing the rate of extraction of protamine and the rate of solution of casein, and Ebbinghaus's curve of forgetting, he postulates the hypothesis that the "memory trace is, rapidly at first and more slowly in the course of time, washed out of the neurones by the circulating fluids; this washing out accounts for the dimming, the fading out, and the becoming discrete which are characteristic of images as they in the course of time decay." Against such an assumption, however, must be placed Dr. Ernest Jones's statement that he becomes increasingly sceptical about such an explanation as that of physiological decay, "for delicate methods of investigation constantly succeed in demonstrating the continued presence in the mind of trivial elements that one might have imagined had disappeared long ago."[2] The issues are important, but can only be mentioned here.

Some Different kinds or Aspects of Forgetting.—While it may ultimately prove to be possible to assign the ex-

[1] "On the Nature of the Process of Forgetting," "Folia Neurobiologica," viii. 5, 1914.

[2] Loc. cit., p. 107.

planation of one kind of forgetting exclusively to the physiologist, it is more profitable at present to attempt to differentiate the phenomena of forgetting from the psychological standpoint. To do so is the object of the rest of this chapter.

The first task, and a difficult one, is to find terms which will convey to others the precise shade of distinction which they mean for oneself. That which follows is an attempt to surmount this difficulty.

When the problem of memory is approached in the light of some of the lessons of psycho-pathology, one of the main characteristics in which various memories seem to differ from each other is the degree to which they have been embodied in the personality. The word embodied here is not used quite literally, but in an only slightly derivative sense; viz. that in which it is employed in military organization. Not a few civilians will recall the shock with which, after the Armistice, they first learnt that a friend, though not yet demobilized, was already disembodied. And they will also remember the great differences in the ease with which, in the case of different individuals, such disembodying could be effected. To develop this example one step farther, a regular soldier, "permanently" embodied, may temporarily though rarely act as if disembodied. This occurs when he occasionally exercises his right to vote as a citizen, possibly, in so doing, even opposing the policy of which, *qua* soldier, he is an agent.

I believe that relations not unlike those described in this example exists between any single memory and that fused background of retained experience which contributes so much to that complex totality which is termed the personality.[1]

[1] In some ways, this conception resembles that of "fused" memories introduced by Rivers. But I prefer to employ the term

With this conception of embodiment in view it is possible provisionally to classify forgotten experiences under the following headings:—

1. Embodied
   - (*a*) Apparently insignificant.
   - (*b*) Significant, but completely congruous with the personality.
2. Exiled.
3. Superseded.

The third heading might perhaps aptly be replaced by a word which is also not unknown in military circles; the adverb "retired"; to be understood in that sense which indicates not merely that the memory has retired; but that it has *been* retired; forcibly placed on the retired list.

These divisions may now be examined in detail. 1 (*a*) embraces the apparently insignificant memories; these of experiences the emotional tone or affect of which was not intense. In the present state of our knowledge we seem to have no alternative but to believe that forgetting this class of experience may conceivably be due to physiological decay, to repression or to the combined action of both these agencies. The first possibility should not be mentioned without the caveat that if under hypnosis or in dreams, such forgotten incidents are eventually recalled, the physiological hypothesis will be discounted in their case.

I should like to suggest, however, that instead of

"embodied," for reasons which will appear presently. And as Rivers, in his book, did not go farther than to suggest such a fusion of memories as a parallel to the fusion of protopathic and epicritic characters which he conceives to exist in an intact nervous system, I cannot estimate the extent to which his conception of fusion and this present one of embodiment may contain common factors.

bowing obediently to this warning, which, however kindly it is given, is in essence little more than a threat, we should try to discover a great deal more concerning the number per individual and the nature of these trivial or insignificant incidents which have actually been so recalled. In a collection of my own dreams I have found memories of very early experiences of childhood, and have been surprised to find that I had not completely forgotten them. But I have not discovered any which did not prove to be part of the associative fringe of some very significant incidents. And it may conceivably prove to be true that only those incidents which for some reason are disembodied, or offer little resistance to the process of disembodiment, form the material for the hypnotist's striking performances too.

With regard to this class of apparently insignificant memories, Dr. Ernest Jones [1] has suggested that forgetting them affords an example of a mental mechanism, originally evolved to carry out one function, being subsequently enlisted for the purpose of fulfilling another, related function. Assuming that the original purpose of repression was to avoid pain, he suggests that the task of excluding from the mind not only painful subjects but also irrelevant ones (which may be conceived likely to cause unpleasure at least), may have been taken over by the repressive function when the time came for the mind to grapple with complicated problems of adjustment to reality. He suggests that hedonic repression might be distinguished from utilitarian repression. To discuss this view in detail would involve an exposition, which is impracticable in the present book, of Freud's distinction between the "pleasure-principle" and the "reality-principle."

Type 1 (*b*) comprises experiences distinguishable, at

[1] Loc. cit., pp. 117-19.

least in degree, from 1 (*a*), in that though they had a significance—albeit not a very deep one—for the individual there is no great tendency for them subsequently to arise in consciousness as independent recollections because of their complete affective congruity with the general tenor of his life. They are as perfectly in agreement with the personality of which they form a part as a regular soldier with his unit. For that reason they do not assert their individuality, and as a consequence, in time they may perhaps lose it. Such experiences if recalled produce no mental conflict, no feeling of novelty, surprise, or disappointment, no pain or unpleasure, but only a degree of mildly pleasurable affective tone. If we compare the difficulty of remembering the details of the everyday conversation of persons who agree with us in everything, with the facility with which we remember the views of those perverse individuals who have the bad taste to dissent from us, we have an example of this obliterating effect of congruity upon past experience. It may probably be assumed that the details of the political conversations or concords which take place every evening in a typical Conservative or Liberal club are not vividly remembered, months afterwards, by the participants. But if one evening, taking half a dozen members whose views are represented by the "Morning Post," we insisted on their dining with an equal number of readers of the "New Statesman," it is probable that details of the conversation would remain in the memory of both parties for a long time. That process of taking for granted so many things in life, which is vitally necessary to the preservation of mental placidity and serenity, also contributes a great deal to forgetting. The mental agency which brings about this forgetting appears to be the *sentiment*, the relation of which to forgetting will be considered later.

It happens quite frequently, of course, that an affectively congruous experience *is* remembered. But I believe that in such cases its recall is attributable to its other characteristics, e.g. its novelty, as when on some memorable evening, our clubman should find his political assertions endorsed by a Cabinet Minister. Characteristics of this type probably explain the well-known remark of Charles Darwin, that he remembered more easily facts which agreed with his theories than those which did not. Such facts were always highly significant to him, novel for some time after he discovered them, and frequently aroused associatively in the course of his work. The ease with which most of us can find reasons against the carrying-out of new projects suggested by others, or against the establishment of a new institution, as compared with the difficulty of justifying on the spur of the moment our own actions or existing conditions, exemplifies the kind of forgetting referred to under 1 (*b*). Probably it contributes in no small degree to the efficacy of the sentiment of patriotism or that of love for one's wife or children. So many things in one's daily relations with one's country and family are taken for granted that they cannot readily be brought into consciousness when required. But listen to a person objecting to Prohibition, to Cubism, to modern ball-room dancing, to the latest fashion in women's dress; how readily reasons against these things tumble out, and how clear-cut to their producer they seem!

Type 2 comprises those retained experiences which are forcibly barred from everyday consciousness. Described in detail by Janet, Freud, Prince, Jung, and many others, its existence is now generally recognized. In comparison with type 3, neither it, nor the two kinds included under 1 can be called neglected by psychology,

though the affective aspect of the latter two types has not yet been sufficiently studied.

We may now turn to the third class, that of the superseded experiences. The phenomena which it comprises are familiar to everyone, yet lately they seem to have fallen between two stools: that of the experimental psychologists and of the psycho-analysts respectively. The meaning which I attach to this class is, I believe, nearly that of Tennyson when he wrote :—

> That men may rise on stepping-stones
> Of their dead selves to higher things.

It is the "dead selves" of the normal, healthy person, and their relations to his living self which to-day present a fascinating challenge to psychological interpretation.

St. Paul seems to express the same idea :—

> But when that which is perfect is come, then that which is in part shall be done away. When I was a child, I spake as a child, I understood as a child, I thought as a child, but when I became a man, I put away childish things.

"I know thee not, old man," says the reformed King Henry to Falstaff :—

> Presume not that I am the thing I was,
> For God doth know, so shall the world perceive
> That I have turned away my former self.

The young king sloughs off his past consciously, but is not some such process constantly at work in all of us; and are not most of its activities submerged so that it is only when we are suddenly brought face to face with part of our past life that we realize how tragically difficult it may be to enter again into communion with it? "When I went back to my native town in Yorkshire," one of the most sympathetic persons I have ever known

once said to me, "the houses had all shrunk. They looked not only smaller, but mean, and I wished I had never gone." How painfully, on meeting some acquaintances of twenty years ago, do we grope for a few threads by which our new self can link up with theirs? But, mercifully, their own selves have grown too. And so it comes about that we escape the distress which in Barrie's play awaited Mary Rose when she returned home the second time. The pathos of the meeting lay not so much in the fact that the selves of her parents and husband had grown in the interval, as that hers had not.

And now it should be clear why the word fused, in its literal sense, can be applied only with difficulty to these memories. They do not seem to be completely embodied, nor are they very forcibly held out of consciousness, as are the types which we meet with in psychopathology. When such memories are brought into our consciousness we may even regard them with cool detachment, though usually our attitude is a more complicated one. But, in any case, to such a memory something seems to be attached which effectually insures that it will seldom be brought into consciousness, that when it is introduced it will come only with reluctance and, once there, will not stay very long. Though the door of consciousness is not violently banged in its face, it closes, slowly, reluctantly, but none the less definitely. That something attached to such a memory is the brand of what, for want of a better word, might be called obsoleteness; we have done with the chapter, or paragraph, of our past life which it represents.

Such an experience may happen in the recall of an event in a person's past of which he has once been morally ashamed, but here, I should surmise, repression

of the ordinary kind plays the chief rôle. Yet there are many parts of a person's past of which he is not ashamed, but which, he discovers on reflection (if he ever reflects on these things) seldom come into his mind, and if they do, quickly go out again. Memories of earlier times in which his artistic or musical tastes were less critical, his desires cruder, his consciousness of self less tranquil, if brought back by any powerful reminder seem to arouse not fear, not shame, not disgust, but a peculiar kind of repugnance. This repugnance is certainly not primitive; it seems to be far too complicated, too mature to justify such a description. The reader may experience in imagination the difference between these kinds of repugnance if he will compare his attitude towards a receptacle containing decaying animal matter with that towards his waste-paper basket if it still contains letters answered and done with days ago; or, better, with his attitude towards those same letters if, scavenged from the basket by a small and illiterate member of the family, they reappear on his desk and he innocently begins to answer them again. The daily paper from last week, read and discarded, which should have been and was not removed from our newspaper rack, the torn and faded finery of a past carnival; only by getting rid of such clutter can we progress: we bear them no ill-will, but they now arouse in us no desire, except for their removal. It is not just because such things represent the past to us that we wish them away; for many a souvenir of the past is fondly cherished. That there are always a few letters which we cannot bring ourselves to tear up is just as significant as the fact that the majority are joyfully jettisoned. In fact our past seems to be divisible into two parts, that with which we have done, and that to which we still cling, or—to

include the lesson which we have learnt from Freud—that which still clings to us.

We referred some time ago to the conception of "dead selves." Concerning it, a few remarks seem expedient. It is almost unnecessary to remark that by the use of such stepping-stones men do not invariably rise to higher things. And to stick to the phrase through thick and thin is not my intention, for I find that Professor T. Percy Nunn, if I understand his meaning aright, has interpreted it in a different sense. In his opinion, "the stepping-stones on which men and societies rise to higher things are never their *dead* selves, but their mnemic [1] selves, alive and actively growing." [2] At this point I am tempted to throw over the simile, but let us stagger with it one step farther. If Dr. Nunn be right, that the stepping-stones are not dead but alive and growing, I still think that there are some factors in our retained past which play a most important rôle in the progressive development of our personality, and yet are as nearly dead as anything which participates in our experience well could be. Thoughts about them, to use William James's expression, "will not develop, they simply *go out.*"

It may be asked whether these superseded memories are not repressed in the sense in which the term would be used by Freud. I think this is possible, yet the circumstances under which such memories remain out of consciousness and, when they enter it, make such a short stay, deserve further examination.[3] These

[1] "At least partly shaped by the organism's individual or racial history."

[2] "Education, Its Data and First Principles." London, 1920, p. 42.

[3] For such investigations the most favourable material is not likely to be afforded by the complex-ridden personalities who form the majority of the medical psychologist's patients.

"dead" memories do not appear to be held out of consciousness by an ever-present resistance, as repressed memories are; it seems rather that they are seldom invited to enter. When they do appear in consciousness they cause a characteristic feeling, which I have already termed a special kind of repugnance. And knowing that sooner or later, abandoning my efforts to find a descriptive word for this experience, I should turn hopefully to Mr. A. F. Shand's "Foundations of Character,"[1] I did so here. The nearest approach to a description of the emotional attitude which I have indicated is given in his remarks on ennui. A few of them are quoted below.[2]

> Between the things that immediately arouse in us either joy or repugnance there are a number of other things that we call "uninteresting," to which we are indifferent. We have no feeling for them. We do not spontaneously attend to them.
>
> But when they detain us they arouse repugnance, because they are "dull and uninteresting."
>
> Now as soon as we feel ennui in dealing with such persons and things, we feel also an impulse to get away from them, because our occupation is repugnant to us. The mind cannot without effort and difficulty maintain attention to them. Lacking all interest, it grows rapidly fatigued. It is this feeling of fatigue which distinguishes ennui from other varieties of the emotion of repugnance. The eye-lids droop; the face lengthens and has a languid expression. We say that certain people "weary" us.
>
> Ennui is also distinguished by the way in which its peculiar repugnance is evoked: namely, not by any objectionable quality in the thing itself, but by the mere fact of our enforced occupation with it. A dentist's drill as it fills a tooth, and sets our teeth on edge, even when it is not painful, is repugnant to us; but we do not call it ennui. In that sudden repugnance there is no fatigue; but fatigue is an essential feature of ennui.

[1] Second edition, London, 1920.

[2] Pp. 410 f.

> The definition of ennui that we have ventured to give follows the principal use of the word in English.
>
> The distinction, then, of ennui as an emotion, arises from the peculiar way in which its repugnancy is evoked, and the fatigue which accompanies it. In respect of its tendency it lacks distinctiveness: following the general law of repugnance in endeavouring to get away from its object and to exclude it from perception and thought.

These passages describe very nearly the attitude of repugnance which is caused by the introduction into consciousness of superseded memories. It seems probable that they would produce fatigue (in Mr. Shand's sense of the word) if they were allowed to dominate consciousness for long. But this is precisely what they are not allowed to do. Of our dead selves it might be said that they would weary us if some agency in the mind did not see to it that they don't.

This brings us to an aspect of forgetting which, I believe, has scarcely been touched by any writer: its relation to the sentiments.[1] To mention it, and to point out some of its implications is all that can be done here. If sentiments, the conceptions of which were born and grew in the relatively calm fields of normal psychology, differ from complexes, those wilder denizens of the jungle of psycho-pathology, only in degree, then we must grant that repression may play a part in the formation of both sentiments and complexes. My own belief is that it does play such a part, and, in the case of some persons and some sentiments one which is far from unimportant. Probably forgetting will never be satisfactorily explained until the relations between sentiments and complexes[2] are made clearer.

It may be at this meeting-point that Dr. Rivers's

[1] Cf. Shand, op. cit.; McDougall, "Social Psychology."

[2] Cf. the symposium on this subject by Rivers, Tansley, Shand, Pear, Hart, and Myers, "British Journal of Psychology," xiii. 2, 1922.

"fused" memories, and Professor Nunn's "active mnemic selves" will meet their fullest explanation. That integration of socially desirable sentiments which forms such an important part in the formation of character may involve many a forgetting of less desirable things. Perhaps, too, "fusion" is made all the closer when the integrity of the character is threatened by the menace of invasion either by a repressed memory or by a moribund self or superseded memory which has suddenly received new life from an unexpected source.

Nobody can be more conscious than I how often in the endeavour to convey my meaning to others, it has been necessary to employ similes and analogies. For this I am ready to apologize, if the words yet exist which will convey my intention directly and without allusion. Perhaps, however, the resort to relatively new metaphors is not wholly deplorable. The common and apparently harmless assumption, that the normal mind assimilates or apperceives its experiences is peculiarly apt to induce in us a placid acceptance of the normal mind as a kind of stomach which absorbs and digests its food once and for all, even though we may do lip-service to the psycho-analysts by dropping the metaphor when we attempt to explain their clinical facts. It is well, at any rate, to remember that even the doctrine of mental assimilation is not free from possibly harmful implications.

We have already pictured the present state of psychology as like that of physics in those great early days when Franklin drew electricity from the thunder-clouds. Many psychologists have recently been among the tempests of the mind. From them they, like Franklin's pupils, have learnt that the lightning-displays are but striking appearances of a force which exists, in a quieter form, everywhere. Yet while

some physicists remained to study the rough weather, others went back to apply the new knowledge to every-day life. And in this respect the parallel between physics and psychology does not appear as yet to be sufficiently complete.

APPENDIX

CHAPTER X

SYNÆSTHESIA

FEW mental phenomena illustrate the enormous range of individual differences so clearly as the "synæsthesias."[1] Their nature and their range of variability may be illustrated by some typical examples. The simplest of these is the familiar fact that a stimulus, besides causing its "own" or appropriate sensation, sometimes sets up a concomitant disturbance in another sense-organ. Some of these experiences are common. It is difficult for many persons to avoid shuddering or grinding their teeth if they hear chalk writing squeakily on a blackboard, or indeed, almost any intermittent noise of high pitch. The writer once knew a dog which, as soon as musical sounds from the piano passed above a certain pitch, howled miserably. At the same time it would move its lower jaw from side to side in a way which strongly suggested that its teeth were "on edge."

Other instances of concomitance of sensation may be more characteristic of particular individuals. A very sour substance often produces, besides its own characteristic taste sensation, muscular contraction and

[1] The short chapter on "Synæsthesia" in E. B. Titchener's "Textbook of Psychology," New York, 1910, is an excellent introduction to the subject.

wrinkling of the skin in various parts of the head. In other people it leads to localized itchings or sweating in the region of the scalp or forehead. As Titchener says, "In some cases the concomitance is stable, in others it is highly variable: in some it is limited, as it were incidental, in others systematic, extending to an entire series of qualities."[1]

In this class of phenomena a group of sensations seems to be accompanied by or to evoke other sensations. In the next class, however, the secondary effects appear to be images, though sometimes they are so vivid that their possessors describe them as actual sensations. The most common of these are the *chromæsthesias;* associations of colours (usually imaged) with different sensations, perceptions, images, or even concepts.

Coloured Hearing. "Coloured hearing" (*audition colorée, Farbiges Hören*) is by no means uncommon. It consists in the appearance of images of colour when sounds are heard. Concerning its possessors two general assertions can safely be made. Not only do they usually regard their gift as completely normal, but they are apt to assume that their own variety of chromæsthesia is the typical or "right" one. A study of even a few cases of coloured hearing, however, might deter one from light-heartedly undertaking the construction of a "colour-organ," or even laying down the most simple generalizations concerning the connexion between sound and colour. For seldom has anyone discovered two persons whose chromæsthesias agree.

These and many other points of interest are excellently illustrated by cases described during the last

[1] Op. cit., p. 195.

few years by Dr. C. S. Myers. Their essential features may be described here. Let us call the first person described A.[1] For A the colours imaged vary with the *pitch* of the notes. The highest audible note is colourless. When the pitch is lowered, the colours change successively to green, greenish-blue, blue, pink, orange, and brown. If an interval of two tones is presented to the subject, he usually distinguishes two colours in the image which it arouses. "Two colours playing around; a muddy mixture" is his comment upon one such interval. He declares that the colours appear quite definitely to him at concerts, but that he usually suppresses them.

During the examination of this subject his synæsthesia appears to have been directly useful in helping him to detect a curious fact in the psychology of hearing, which is known to few besides musicians and scientists, and of which this unmusical person was quite ignorant. When a pure tone is compared with a complex musical note, or "clang," the fundamental tone of which is equal in vibration-frequency to the pure tone, the pitch of the clang appears to be higher than that of the tone. This difference of pitch was detected by this subject not directly through his ear, but indirectly, by way of the fact that the colour of the clang appeared lighter; i.e. nearer colourlessness, than that of the tone.

Like B, whose peculiarity will be described in a moment, A has very poor visual imagery. The sounds, A declares, do not produce "images" of colour. He does not see the colours unless the sounds recall a

[1] "A Case of Synæsthesia," "British Journal of Psychology," 1911, iv. pp. 228-38.

coloured object ; e.g. "the sky after sunset," "a B.A. hood," "a pink finger bowl." [1]

B is an accomplished painter, and takes a keen enjoyment in hearing music, although she does not play on any instrument.

The flow of colours she experiences in listening to music [2] afford her "enormous pleasure." They vary with the composer ; the works of Chopin, for example, yield "very translucent colours such as green leaves in the spring," whereas those of Schumann "never give primary colours, they give purples and the like—not transparent colours." The colours come more reliably when they are not specially looked for : "it is so difficult to be truthful when one is watching."

Individual tones have each a colour dependent on their pitch ; but the colours, as given in the following table, show a sequence very different from that described in the case of A.

Pitch of Tone.	*Colour.*
256 (Middle C)	Prussian blue, clear blue.
300	A clear mixed colour, a suggestion of streakiness, dark blue streaked with violet.
400	Clear dark violet—clear purple.
500	Deeper than red, very deep golden, transparent.
600	No definite colour, opaque, streaky, perhaps black and flame colour.
700	No definite colour, uninteresting, perhaps light green.
800	Blue.
900	Rather like 800.
1200	Might be yellow, something of that nature, very translucent.
2048	Getting yellow.

[1] C. S. Myers and C. W. Valentine, "Differences in Attitude Towards Tones," British Journal of Psychology, 1914, vii. pp. 81 f.

[2] The following quotations are from C. S. Myers, "Two Cases of Synæsthesia," *ibid.* 1914, vii. pp. 115 f.

In this subject we appear to have (i) a change in hue from blue through purple and reddish-yellow to green, for tones varying from about 200 (256) to 700, and (ii) a broadly similar repetition of this flow of colours—from blue through yellow to green—for tones ascending from 800 towards the upper audible limit. The blue of 200 became more and more purple as the lower limit was approached, e.g. "much darker and more purple than the gentian" (128), "still more purple" (64), etc.

It was remarked by the subject that the colours almost invariably appear to her as uniform or streaky (streaked with "black" or "light"), clear or opaque, smooth or rough. Yet there was "no form in the colours;" hence she could not explain, for example, in what direction the streaks were running.

Like A, B is more "alive" to the colour components than to the tonal components of sounds. She "may be aware of the presence of several colours where the number of simultaneous tones is not attended to." She also resembles A in that the effect of increasing the richness of a tone by adding to its overtones "raises" the colour of the tone.

The description by Dr. Myers of a third case[1] is of great interest to the music-lover, for it is of the Russian composer, Alexander Scriabin. For Scriabin, colours were so inextricably associated with sounds, that he desired his "Prometheus" to be performed to the accompaniment of concealed lamps which should flood the concert hall with a light of ever-changing colour; the music of his "Mystery," he directed, should be presented with a similar play of colours, and even with odours.

Scriabin's attention was first seriously drawn to his coloured hearing owing to an experience at a concert in Paris, where, sitting next to his fellow-countryman and composer Rimsky

[1] Loc. cit.

Korsakov, he remarked that the piece to which they were listening (in D major) seemed to him yellow ; whereupon his neighbour replied that to him too, the colour seemed golden. Scriabin has since compared with his compatriot and with other musicians the colour effects of other keys, especially B, C major, and F ♯ major, and believes a general agreement to exist in this respect. He admits, however, that whereas to him the key of F ♯ major appears violet, to Rimsky Korsakov it appears green ; but this deviation he attributes to an accidental association with the colour of leaves and grass arising from the frequent use of this key for pastoral music. He also allows that there is some disagreement as to the colour-effect of the key of G major. Nevertheless, as is so universally the case with the subjects of synæsthesia, he believes that the particular colours which he obtains, must be shared by all who are endowed with coloured hearing.

As the musical reader will now have gathered, Scriabin's chromæsthesia refers, not to the pitch nor to the name, nor to the timbre of any particular note or combination of notes, but to the *tonality* of the music ; its relationship to the chief tone, called the "tonic."

As the tonality changes in a piece so the colour changes. Scriabin explains that "the colour *underlines* the tonality ; it makes the tonality more evident." The colour or a change of colour sometimes appears to him before he is aware of the tonality or of a change of tonality. . . . In general, when listening to music, he has only a "feeling" of colour ; only in cases where the feeling is very intense does it pass over to give an "image" of colour. The older music with its infrequent changes of tonality, gives him a colour changing in intensity instead of in quality ; "it has not the psychological basis of modern music." Certain compositions, and most of Beethoven's symphonies, are not of a kind to need colour ; they are "too intellectual in character."

For Scriabin, a single note has in itself no colour ; it has the colour of its tonality. Perhaps, in attempting to realize the meaning of this, the completely unmusical

reader may find it useful to consider how a pronoun in a sentence has in itself no colour, no character, no personality, but naturally absorbs and reflects the significance of the noun which precedes it.

> The strongest colours for Scriabin appear to be those relating to the keys of C major, D major, B major, and F♯ major, placed respectively in the red, orange, yellow, blue, and violet. Starting, however, from C at the red end of the spectrum, Scriabin finds that
>
> | Red | Orange | Yellow | Green | Blue | Violet |
> |---|---|---|---|---|---|
> | C G | D | A | E | B | F♯ |
>
> as he passes from hue to hue, the successive colours correspond to tonalities rising by a series of fifths. Thus the key of C is red, of G red to orange-red, of D orange to yellow, of A yellow to green, of E green to blue, of B blue to violet, and of F♯ violet. The colours of the remaining keys D♭, A♭, E♭, B♭, and F are believed by Scriabin to be extra-spectral—either ultra-violet or infra-red. Thus the key of F is "on the verge of red," giving often the effect of a metallic lustre.

Dr. Myers suggests that a pre-requisite for a complete development of synæsthesia is the tendency to be conscious of similarities not only between single experiences, but between whole series of experiences; "a tendency to form associations between corresponding members of two homologous series."[1] Such a tendency is seen in a very simple form when in certain persons a letter of the alphabet is apt to suggest the number expressing its position in the series.

Such a set of associations might easily be caused by environmental accidents; an example of which I discovered while writing this chapter. During the period of life in which they were beginning to recognize letters and simple numerals, two of my children have sat at

[1] "British Journal of Psychology," 1911, iv. p. 238.

meals behind a white enamelled tray on which the letters of the alphabet in black are arranged in a semi-circle over their corresponding numbers in red. Here, indeed, are the potentialities of a "number-form," [1] of coloured numerals, and perhaps even of quainter serial associations.

A further suggestion made by Dr. Myers is that such a tendency mentally to arrange series in parallel may yield the diagram on page 184, in which consecutive scales are associated with consecutive colours.

These studies have been quoted at length because they carry our knowledge much farther than the earlier reports on synæsthesia,[2] which indeed did little more than to record parallels between the experiences from different senses. In the books of others will be found descriptions of many varieties of coloured hearing, e.g. of coloured vowel sounds and of coloured voices.[3]

Coloured hearing is only a special example of the linking of sensations, for in theory any two sensations might be so coupled. Indeed, these sound-photisms, as they have been called, are paralleled by odour-photisms, touch-photisms, and pain-photisms.

From the linking of sensations with sensations, and of sensations with images we pass naturally to a third class, in which images or even sensations are called up not so much by the sensory qualities of the stimulus as

[1] Cf. chapter xi.

[2] E.g. Galton's in the "Inquiries into Human Faculty," pp. 105-12.

[3] Dr. D. Fraser Harris in an article entitled "Coloured Thinking and Allied Conditions" ("Science Progress," 1914-15, ix. pp. 135-52), gives a very interesting account of these phenomena, illustrated by numerous examples and accompanied by a bibliography of sixty-six titles.

by its perceptual meaning. A good example of this is the seeing of colours when letters or words are spoken or read. To some persons such colours appear when the word is merely imagined; for others the imaged word does not always evoke the colour. In some cases each separate word and letter has its distinct colour, e.g. to one person "Harry" and "Carrie," which are very much alike in sound and not very unlike in appearance, are dark red and dark blue respectively. Yet the sensory qualities of the word are effective in the mind of another person, for whom the colour of a word is the colour of its initial letter, e.g. "as *a* is blue, Alice is blue, and because *s* is yellow, Sunday is yellow,"[1] and still another to whom "rhyming words, for instance, Harry and Carrie, frequently, though not always, suggest the same colour, indicating . . . that the colour is directly connected with the sounds."

The association of colours with hours of the day, days of the week, and months of the year has been described by many writers, and calls for no further comment here.

It is well known that not a few persons ascribe colour to different individuals, while some attribute colour to their characters. Mr. Edward Bullough, in his experimental investigations of æsthetic appreciation,[2] has found many instances of the attribution of character to colours. To discuss this double associative bond between colour and character, however, would involve us deeply in theories of æsthetic appreciation.

[1] This and the following example are taken from Professor M. W. Calkins's article "A Statistical Study of Pseudo-Chromæsthesia and of Mental Forms," "American Journal of Psychology," 1892-93, v. pp. 439-64.

[2] "British Journal of Psychology," ii., iii., v., x., xii. Cf. also C. W. Valentine, "The Experimental Psychology of Beauty." London, 1913, pp. 30-7.

Other attractive problems which can only be mentioned here are those of the origin of chromæsthesia (whether it is congenital, acquired, or attributable to both factors); its possible connexion with original differences of neural structure; the explanation of the definiteness and unchangeableness of the colours experienced, and the possible influence of unconscious intermediate associations.

CHAPTER XI

NUMBER-FORMS[1]

AN excellent illustration—and, to those unfamiliar with it, an amazing one—of the manifold ways in which meaning may be carried by imagery is afforded by the number-form, one of the perennial delights of the beginner in psychology. The characteristics of this type of mental apparatus were first described by Galton.[2] Since his time, however, comparatively few treatments of the subject are to be found in psychological literature.[3]

To those readers who do not possess this mental gift, Galton's original description may be recommended. He mentions that persons who are able to visualize a number sometimes see it not only lying in some particular direction with regard to themselves but also at some definite distance.

> If they were looking at a ship on the horizon at the moment that the figure 6 happened to present itself to their

[1] Reprinted from the "Memoirs" of the Manchester Literary and Philosophical Society, 1922.

[2] "Inquiries into Human Faculty," pp. 79-105.

[3] Professor M. W. Calkins's article on the subject ("American Journal of Psychology," 1892-93, v. pp. 439-64) contains much valuable information. Professor G. E. Müller's "Zur Analyse der Gedächtnistätigkeit und des Vorstellungsverlaufes," Leipzig, 1913, Part III, pp. 72-131, gives a lengthy general account of this phenomenon, with reference to the work of others. The three works quoted above, together with the results of examining a series of number-forms kindly contributed by the author's friends, form the chief basis of this chapter.

minds, they could say whether the image lay to the left or right of the ship, and whether it was above or below the line of the horizon; they could always point to a definite spot in space, and say with more or less precision that that was the direction in which the image of the figure they were thinking of first appeared.

Now the strange psychological fact to which I desire to draw attention, is that among persons who visualize figures clearly there are many who notice that the image of the same figure invariably makes its first appearance in the same direction, and at the same distance. Such a person would always see the same figure when it first appeared to him at (we may suppose) one point of the compass to the left of the line between his eye and the ship, at the level of the horizon, and at twenty feet distance. Again, we may suppose that he would see the figure 7 invariably half a point to the left of the ship, at an altitude equal to the sun's diameter above the horizon, and at thirty feet distance; similarly for all the other figures. Consequently, when he thinks of the series of numerals 1, 2, 3, 4, etc., they show themselves in a definite pattern that always occupies an identical position in his field of view with respect to the direction in which he is looking.

The pattern or "Form" in which the numerals are seen is by no means the same in different persons, but assumes the most grotesque variety of shapes, which run in all sorts of angles, bends, curves, and zigzags as represented in the various illustrations to this chapter. The drawings, however, fail in giving the idea of their apparent size to those who see them; they usually occupy a wider range than the mental eye can take in at a glance, and compel it to wander. Sometimes they are nearly panoramic.

To the person who possesses no vestige of a number-form such a description may seem far-fetched. He is, however, likely to discover on investigation that it has been fetched from no farther than next door. Yet many people who possess no number-form indubitably show the undeveloped foundations of one; for number-forms are by no means rare. Of 525 persons who were questioned, 35, or 6·7 per cent, were found to possess them. Moreover, the answers of many people who

possess no number-form imply that the undeveloped foundations of one are present in their mind. Phillips, for example, found that of 250 adults, who believed that they possessed no number-form, not less than 210 had a feeling that numbers in some way recede from them. Many reported that they have an upward movement. For others they appeared to go straight in front or at an angle of 45°.[1]

It is the striking absence of such vagueness, however, which usually characterizes the description of a number-form by its possessor. Often he will readily assent to a suggestion that he should make a tri-dimensional wire model of it. The quick look of intelligence with which he answers your questions—as if, writes Galton, some chord had been struck which had not been struck before—and the rapidity and preciseness of his replies impress one only a little less than the frequent confession that up to that moment he had supposed every one else to possess his gift.

The reader will find in Galton's book descriptions of many number-forms. To them may be added the following account of a form which, while it illustrates many usual characteristics, is of interest in that in certain other important respects it cannot be called typical. It is that of Professor W. M. Tattersall, of Cardiff, to whom as well as to other friends mentioned below, I express my thanks for their kindness in readily supplying me with these details.

> The essential parts of my number-form are shown in Fig. C (1). There is an incomplete circle, round which the numbers 1 to 12 are placed equidistantly. This is simply a clock face, but there is always a gap between 12 and 1, not filled in. The numbers from 12 to 20 are arranged in a straight line sloping down from 12 and away from it. The

[1] Cf. Müller, loc. cit.

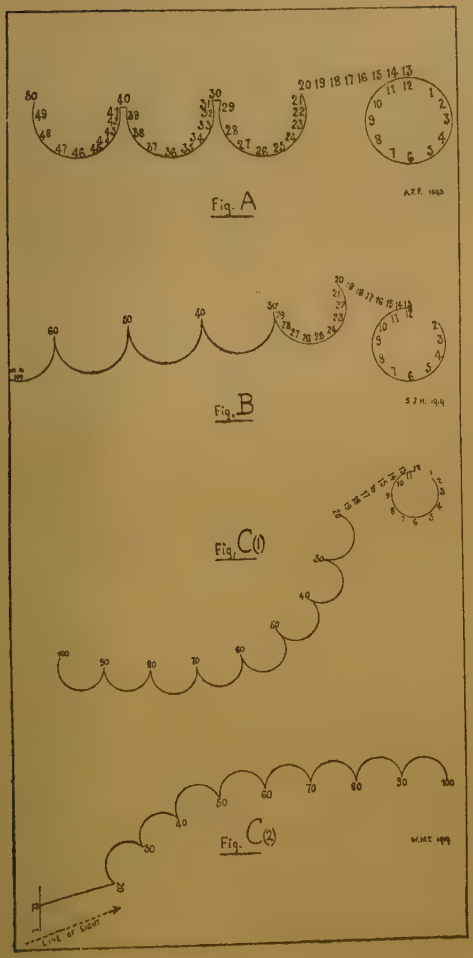
Fig. A
Fig. B
Fig. C(1)
Fig. C(2)
Line of sight

numbers from 20 to 100 are arranged in a series of semicircles[1] of 10, round a semicircle, so that 100 is on the same level as 20. But the number-form is not all on the one plane, and in Fig. C (2), I have attempted to show exactly how it appears to me. The whole scheme is visible at once, and I appear to be looking down on it from above, along a line of sight indicated by the "arrowed" and dotted line. Thus 20 is lower down than 12, and 36 is the lowest of all the numbers. The numbers 36 to 100 are increasingly higher up, the number 100 being on the same level as 200 but much farther away. The plane of the semicircle on which the semicircles of numbers from 20 to 100 lie is inclined at an angle to the plane of the numbers 12 to 20, so that the number 36 besides being the lowest of the numbers is also the farthest away to my left.

When thinking of any number from 1 to 100, I immediately visualize it in its place in this scheme. For numbers higher than 100, the visualization varies according to the character of the number. For instance, 400 has the same position as 4, 900 as 9, 1200 as 12, 1700 as 17, 2000 as 20, and so on. But for numbers like 425 there is a general tendency to split the number-form into two parts, first visualizing 4, then 25. For numbers sufficiently near to 100, say 337, I visualize at once three complete schemes and the position of 37 in the fourth scheme. But as the numbers get higher, as for instance, 876, I visualize 8 and a diminutive scheme between 8 and 9 in which the position of 76 is visualized. In the higher numbers, such as 4678, the splitting of the visualization is always complete ; I visualize the position of 46 and 78.[2]

When adding or subtracting numbers like 460 and 780 the

[1] (Author's note.) An important emendation of the word semicircle, added subsequently by Prof. Tattersall, appears on p. 193. I have thought it best to give the original term here.

[2] (Added subsequently.) "The relative scale in which one is thinking often determines the position of a number in the number-form. For instance, it is usual to think of salaries in terms of *hundreds* of pounds, and so in visualizing the 2000 in a salary of that dimension it becomes 20 hundreds and has the position of 20. On the other hand, populations of places are usually thought of in terms of *thousands*, and the 2000 in such a case would have the position of 2."

positions of 46 and 78 are the dominant ones. But if the numbers were 468 and 784, then the positions of 68 and 84 would be the dominant ones. 10,000 has the same position as 10, 20,000 as 20, and so on up to 100,000, which has the same position as 100.[1]

Sums of money are visualized according to their size. Sums between 1d. and £1 are usually visualized in pence, but if even shillings then they are visualized according to the number of shillings. Thus 15s. visualizes as 15, but 15s. 6d. as 186. Sums between £1 and £5 are invariably visualized in shillings. Above £5 they are visualized in pounds, just like ordinary numbers.

One important feature of this form is that the numbers themselves are not seen, their position only being visualized. This may be connected with the fact that the form carries relative as well as absolute values. The same point in space may represent, in different contexts, 17, the age of adolescence, the XVIIth Dynasty or one-and-fivepence.

The negative values are represented by a mirror-image of the number-form. This extends behind the head. When learning algebra, the use of this form obviated any difficulties in grasping the conception of adding to, or subtracting from, positive numbers, numbers of negative value.

After making a wire model of his number-form, and discussing it at the meeting of a scientific society, Prof. Tattersall requested me to add a note that closer acquaintance with and analysis of his number-form had persuaded him that the loose term semicircle should be replaced by "¾ circle." He writes: "Semicircle is perhaps not strictly accurate. On analysis, the part-circles, on which the groups of tens are arranged, are obviously the original clock-face with the portion from 10 to 1 left out, and are therefore ¾ circles." He also

[1] (Added subsequently.) "1,000,000 has the same position as 10"

points out the interesting fact that his number-form became unconsciously adapted to increasingly complex figures as they became known to him. But as these notes were made some time after he became scientifically interested in his own number-form, he requests me to keep them separate from the original description.

This visual representation in space of the negative numbers is an interesting aspect of the question which seems to have been insufficiently studied. One of my correspondents, whose form, in most respects, is quite a usual one, has "not a definite line, but a sense of division" between zero and −1, and is then "conscious of numbers up to −10 being there." The minus figures, she writes, "are very indistinct and in darkness; for some reason I connect all below 0 with Hell." This condensation of a numerical with an eschatological meaning illustrates a trait rather unusual in number-forms; the usual characteristic of this class being—to use a popular expression—"to keep themselves to themselves." The discovery of the reason for this exclusiveness might cast more light upon the relation between image and meaning.

The Development of Number-Forms.—According to G. E. Müller, persons have been observed in whom a number-form existed before the knowledge of numbers, and before its possessor could read. He suggests that the new direction so often taken at 10, 20, or another low number, may be due to the development of the form beginning at the time when the child learns to count, and ending when he has achieved the performance of counting up to 100. Yet forms certainly exist which, arising in early childhood, were subsequently supplemented or modified under the influence of new needs or ways of living: Flournoy[1] mentions one which appeared in the seventeenth or eighteenth year of life.

[1] "Des phénomènes de Synopsie." Paris, 1893.

The effect upon a number-form of the passage of time is interesting in many ways. Galton, when he described these phenomena in 1883, had few data upon which to base any general statement. He quotes Colonel Yule, who writes that he found his number-form to have become sensibly weaker in later years; "it is now faint and hard to fix.[1] But in 1919, Professor Sir Arthur Schuster, F.R.S., whose number-form was described by Galton[2] in 1883, kindly sent me the following answers to my questions :—

(*a*) Has the number-form changed at all between 1883 and 1919?

> I find no change.

(*b*) Has the number-form become sensibly weaker in later years?

> My impression is that the vividness simply depends on use. When I work much with figures, and more especially with questions that involve historical dates, as I had to do recently, the form is as vivid as ever it was. For centuries in historical dates I depend on associations. I would think of Leonardo da Vinci, Galileo, Newton as the case may be. The result is that I frequently make a mistake in the century when suddenly called upon to give a date, and also by a year or two, as I have to work by the diagram.

This fact, that the vividness of the diagram depends upon the use made of it, is brought out by another of my contributors, a business man, who tells me that numbers which he habitually uses, e.g. 15 (for 1s. 3d. per yard), stand out more brightly than the others. An absence from business through illness caused the numbers to become dim.

Their Utility.—The supposition is erroneous that all possessors of number-forms necessarily use them whenever they think of a number or set of numbers. Galton's

[1] P. 95.

[2] Pp. 94-5, and Plate I, Fig. 21 in the "Inquiries."

original statement[1] "(The peculiarity) consists in the sudden and automatic appearance of a vivid and invariable 'Form' in the mental field of view *whenever* a numeral is thought of, . . ." would naturally tend to deepen such a belief. But the number-form described on pp. 190-94 is not used when the day of the month, or degrees of latitude and longitude are thought of; in these cases there appear visual images of a wall-calendar or of a map, on Mercator's projection. And as Flournoy has shown, a number-form may be used by a person for one kind of operation (e.g. writing down a series of figures) but not for another, such as thinking of a date. Moreover, the answers to questions concerning the utility of these forms show that many persons who possess them consider them to be useless. Calkins found that of 67 persons so questioned concerning the usefulness of number-forms both in mathematical operations and in remembering dates, 29 were sure they were useful while 21 were sure that they were not. Of Phillips's 211 subjects, 97 declared that their number-form was useful in reckoning, 113 that it was neither useful nor harmful, and one that he was disturbed by it.

In this connexion it is interesting to note that one of the examples in my own collection is an *algebra*-form. It consists of a vertical line with a horizontal line crossing it, the zero being at the point of intersection. Positive quantities are visualized as proceeding vertically upwards and negative ones downwards. There are no gradations on the lines other than those actually in use at the time. In thinking of $a - b$ the subject feels that b is pulling the a down, and the a pulling the b up. Frequently a circle appears round the zero point; the result of his addition and subtraction must then lie

[1] P. 82. Italics mine.

within that circle. He cannot do algebra without this form, and he possesses no number-form.

The tendency to visualize connected series of entities spread out in space does not apply only to numbers. Calkins mentions "forms for piano-notes (squares) with lines for violin notes: and an interesting prayer-form, well remembered from the time when the progress from one part to another was always the passage from one part to another of the form." [1]

One of Lemaitre's subjects possessed 30 diagram-forms of different kinds; one of Müller's saw, in the part of his year-diagram corresponding to the beginning of spring, a fair youth holding a staff decked with apple-blossom, and with apple-blossom in his hair.

The Alleged Heredity of Number-forms. — Upon this question there appears to have been not a little confused thinking and generalization from insufficient evidence; even occasionally from evidence which is opposed to some of the conclusions drawn from it. It is therefore necessary to distinguish different senses in which number-forms might be conceived as transmissible by heredity. There might be handed down a general tendency to visualize, a more specific tendency to visualize numbers in space, or an even more specific tendency to visualize a particular kind of number-form.

Galton believed in transmission, not only in the second but also in the third sense mentioned above. He writes:—

[1] The writer remembers, though unfortunately he has no written record of it, that a "commandment-form" of a curious kind was once mentioned by a correspondent to the "Westminster Gazette." Each of the ten commandments was localized at some part of the correspondent's native village; e.g. one might be thought of as localized at the bridge, another as at the school door.

> I have the strongest evidence of its (the peculiarity's) hereditary character after allowing, and over-allowing, for all conceivable influences of education and family tradition.[1]
>
> I give four instances in which the hereditary tendency is found, not only in having a Form at all, but also to some degree in the shape of the Form.[2]

These tendencies which he conceives to be hereditary, he compares to the instincts of animals. He likens the "natural fancies for different lines and curves" of different persons to the universal tendency of animals of each species "to pursue their work according to certain definite lines and shapes, which are to them instinctive, and in no way, we may presume, logical." He reminds us of the groups and formations of flocks of gregarious animals, of the wedge-shaped phalanx of wild ducks on the wing, and of the huge globe of soaring storks. He records his expectation that if a spider were to visualize numbers, he would do so in some web-shaped fashion, and a bee in hexagons.[3]

Yet on reference to his diagrams, and to the explanations offered with them,[4] the most which can be said is that while they suggest that the tendency to have a form may run in families, they afford no evidence of an hereditary tendency to have an identical or even a closely similar form. Moreover, on examining Plate III of the "Inquiries," which is reproduced upon page 199 of the present book, one is immediately struck by the unlikeness of the four forms possessed by the Henslow family (Figs. 46-49), and of Figs. 57 and 58 both from each other and from Figs. 55 and 56, though these latter four all belong to the same family. The heading of Plate III, "Instances where the Number-forms in same family are *alike*" seems then to be

[1] P. 82. [2] P. 100.
[3] P. 88. [4] P. 100.

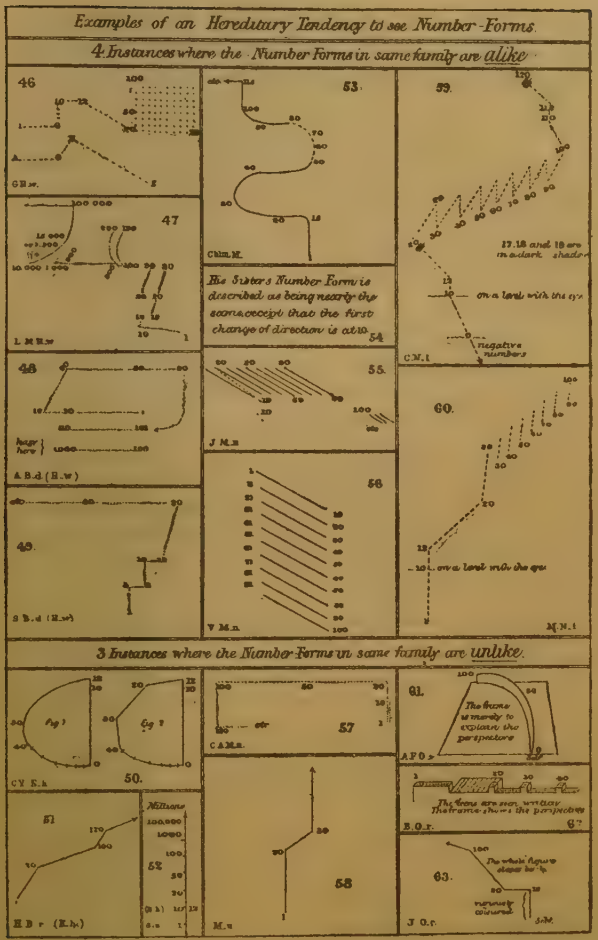
Examples of an Hereditary Tendency to use Number-Forms.
4 Instances where the Number Forms in same family are alike
46
47
53.
59.
17.18 and 19 are in a dark shade
on a level with the eye
negative numbers
The Sister's Number Form is described as being nearly the same, except that the first change of direction is at 10.
54
48
55.
60.
on a level with the eye
49.
56
3 Instances where the Number Forms in same family are unlike.
50.
57
61.
The frame is merely to explain the perspective
The frame is not necessary to understand the perspective
51
58
63.
The whole figure sloped back
nervously coloured

Plate III from Sir Francis Galton's "Inquiries into Human Faculty;" reproduced by the kind permission of the University of London.

somewhat misleading, except in the case of the pairs 55 and 56 and 59 and 60, which we shall now consider.[1]

Figs. 55 and 56, those of a father and son, are undoubtedly similar. Their chief differences are that while the general direction of one is horizontal, that of the other is vertical, and that one ends definitely at 100 while the other, ending at 99, appears to begin another form at 100.

Figs. 59 and 60 are those of a brother and sister, less alike than the preceding pair, but certainly similar.

Before commenting further upon these pairs, however, we may examine a set of three number-forms supplied by three persons who are entirely unrelated.[2] Fig. C (1) is Prof. Tattersall's; Fig. B is the number-form of Prof. S. J. Hickson, F.R.S., of Manchester; Fig. A, from the "American Journal of Psychology," is that of an unknown person.[3] Neither of the first two contributors, when they communicated with me, had any idea that a similar number-form was possessed by a colleague,[4] nor, at that time, did either of them know of the existence of Fig. A, which I found while examining the literature on this subject, after the receipt of Fig. C (1) and before receiving Fig. B.

Most of the structural features of these three forms appear to be almost identical. Save for the presence of a gap after 12 in Figs. B and C (1), and its absence in Fig. A, the salient features of the forms are the same. The direction of the line between 10 and 20

[1] The likeness of 53 and 54 cannot be accepted as convincing evidence in this connexion, since 54 is not figured, but only described as "nearly the same (as 53) except that the first change of direction is at 10."

[2] See page 191 of this book.

[3] Figured in Calkins, *ibid.* p. 448.

[4] At this time Prof. Tattersall was at the University of Manchester.

varies and, while it is definitely curved in Fig. B, it is slightly curved in Fig. A and straight in Fig. C (1). The extents of the forms are not identical.

The chief difference between the forms is that while Fig. C (1) is emphatically tri-dimensional, and for its possessor this is one of its most important features, Fig. B is almost in one plane, while concerning Fig. A no relevant data on this point have been given. Yet, having pointed out these differences, it seems justifiable to hold the opinion that the degree of resemblance between these three compares very favourably with that of most of the "similar" pairs adduced by Galton in support of his belief. It might be emphasized that not only has this trio been obtained from entirely unrelated people, but that the coincidence is of three and not of two cases, a fact significant in itself. Moreover, a glance at numbers 20[1] and 2 of the forms in Plate I of the "Inquiries" will show that these two latter are not very unlike the three figured above; and that No. 37 in Plate II, though an elaborate structure, contains the essentials of these three forms.[2]

The possessor of Fig. A in the above collection of three forms definitely attributes the chief feature of his form to a post-natal cause; the perception of a clock. He says:—

> I cannot explain the origin of the almost straight lines between 12 and 20, but the curves came from the fact that I learned to tell time before I learned to count, and when I did learn, everything reverted to the picture of that old clock.

[1] That of Mr. George Bidder, Q.C., the son of a famous calculator, and himself able to multiply mentally fifteen figures by another fifteen figures. In the present connexion the gap in his form after 12 is interesting, as it corresponds to those of Figs. B and C (1) which have just been mentioned.

[2] Note, too, that it shows the gap after 12.

Prof. Tattersall writes, after having read this explanation :—

> The semicircles in my form are, I suppose, the remains of the clock face, and this would explain why 6 is always the lowest figure in a semicircle. For instance, I told you 36 was the farthest away to my left. Well, of course, 36 is the lowest figure in its semicircle.
>
> I think my form is undoubtedly derived from the clock face and I have always thought so. It is of course a very simple number-form and might very reasonably be explained on the "earliest recollection" theory. I know I was much fascinated by clocks and watches as a child, and I could tell the time almost as soon as I could talk.

Yet another objection to Galton's assumption arises when the chief turns in number-forms are examined. Calkins found that three-fourths of the turns were at numbers which are prominent in early arithmetical exercises and in ordinary usage. One of my contributors writes of her number-form, which she calls a "figure-board" :—

> My figure-board changes at tens, except at the first twelve, where there is a rather distinct modification of the line. I am not English born, but French-Swiss, and all my arithmetical calculation has been based upon the decimal system. Do you think the duodecimal system as used here may affect the figure-board of English people?

Detailed evidence has now been obtained that very complicated objects in a person's environment may give rise to number-forms, which can be traced definitely and completely to their influence. Hennig[1] shows that both his own number-form and that of his brother were essentially determined by the arrangement and illumination of the houses in the Potsdamer Strasse in Berlin. The house numbers in the street had particularly interested them when they lived there in early childhood.

[1] See Müller, loc. cit.

The number-form of another brother was attributable to the pathways and numbers in the Berlin *Zoological* Gardens, which he often visited. Phillips mentions a child who, when five years old, could add numbers only when he was in a room with a clock, the hour-spaces of which he counted. At the age of seven this child "used the clock-face mentally." To all this evidence may be added the fact that in some number-forms the negative values are represented; this seems to render any simple belief in their hereditary character quite untenable.

The most, therefore, that can justifiably be believed concerning the possible heredity of number-forms is that the tendency to visualize may be handed down; transmitted, maybe, in purely physiological terms as an inheritance of a specially favourable neural basis in the brain. Yet in the way of even this simple belief there lie some formidable obstacles. It is quite clear that the power of visualization can be greatly strengthened by practice. Galton himself lays stress upon this fact,[1] and Dr. J. Varendonck has recorded his own recent progress in this respect.[2]

> I have even noticed of late that when I happen to read poetry now I am able voluntarily to transform the poet's words into visual images, which adds a hitherto unknown charm to the reading.

It seems, indeed, quite possible that any kind of imagery, even that in which a man may consider himself to be very poor, may be enormously developed during life, so that the facts seem to justify little more than the belief that congenital differences in visualizing power may be significant.

[1] P. 73 f.

[2] "The Psychology of Daydreams." London, 1921, p. 90 (footnote).

The Progressive Complication of the Functions of Number-Forms.—In books upon the general theory of psychology little attention seems to have been paid to the significance of the number-form as an excellent "objectifiable" example of a vehicle of simple or complicated meanings; an example, moreover, the nature of which can be made plain to other people. An examination of these forms illustrates clearly the different degrees of complexity which the "image-meaning" relation may reach. The simplest representation of quantities by the number-form occurs when the actual numbers are seen arranged in fixed spatial relations. Rather more complex is the representation when the numbers are not visualized but only thought of, their positions in space being seen mentally. At a third stage these positions themselves acquire a relative as well as an absolute significance, when the actual quantity attributed to any position may be merely a special instance of some more general meaning.

Such a use of his number-form is often made by Prof. Tattersall. Any position on the form, though absolutely fixed in space, may represent any one of a large number of related quantities, or even the subject or theme of which a quantity is merely one characteristic.[1] Such a form, representing almost any kind of related quantity, has reached another stage in a line of development which, if continued, would lead through infinite gradations to the formation of an image which carries the unquantitative essence of mathematical conceptions. A very high position in this scale of evolution must be occupied by Professor Einstein's diagram of a large sphere tenanted by exceedingly small beetles with which he has recently illustrated his conception of a finite but unbounded space.

[1] An example of this variability of meaning of a fixed point on this number-form has been given on p. 193.

CHAPTER XII

THE INTELLECTUAL RESPECTABILITY OF MUSCULAR SKILL[1]

TO recount briefly the chief considerations which led to the writing of this chapter is the most direct way of introducing the problems implied in its title. The first was that in this country, during the past thirty years, a greatly increased number of persons have shown enthusiasm and respect for bodily exercise of all kinds. Contemporaneously with a growing acceptance of its naturalness and desirability there has appeared a rapid extension not only of athletic games and sports but of gardening and of many hobbies involving physical activity. Though few of these occupations are new, the psychologist's interest is aroused not only by this increase in the number of their devotees, but also by the change of attitude towards bodily exercise which is rapidly becoming more apparent amongst those whose beliefs about the subject have not been cultivated by the English public schools.

At one time many a serious-minded person above the age of thirty, caught playing an outdoor game, would have felt it his duty to justify himself to his detectors. He would probably have explained that he was preparing to do a better day's work on the morrow; a

[1] The substance of this chapter was read to the British Psychological Society on 12 March, 1921, and published in the "British Journal of Psychology," 1921, xii. pp. 163-80.

rationalization containing nearly enough truth in it to make it a good reason. But nowadays many people play games and take exercise without dreaming of inventing any such elaborate nineteenth-century justifications. If pressed for a reason, they would probably say that to keep "fit" is a duty to oneself.

"Fitness," prized so dearly by those who for any long time have ever experienced its opposite, contributes to self-respect at least as solidly as the awareness of moral rectitude. In this contribution it is not easy to appraise the relative values attached to the outward and visible signs of fitness and to its inward and spiritual grace. The former seem to be coming into their own again to-day. But the consciousness of bodily and mental alertness, of independence and self-confidence depends to no small extent upon the general inner feeling of one's body, the *Binnenleben*. Who has not felt the widening of self, the new accession to personality, due to the successful acquisition of even mediocre skill in some athletic sport which involves a whole new set of muscular co-ordinations; the experience of "living in one's body" which is the reward of a few days' physical exercise following upon weeks of concentrated mental work?

From another direction comes an unmistakable message of the same tenor. Medical men who deal with the problems of diseases incidental to industry are realizing vividly the maldevelopment and the primary and secondary illnesses, physical and mental, arising from it, which are the lot of the "one-muscle man"—the title of a recent article on this subject.[1] From it we may borrow a comparison of the village blacksmith with the specialist who nowadays fulfils a few of his

[1] "The Times" Trade Supplement, 20 September, 1920.

predecessor's duties. In order faithfully to represent this latter person the old picture would have to suffer so many deletions that even the most modern painter might be satisfied with the result. The spreading chestnut tree must go, of course, but can we honestly leave in the large and sinewy hands? And, worse; how many muscles in his (possibly) brawny arms would be as strong as iron bands if, week-in week-out, by directing a machine he performs a repetition-job with the least possible number of movements?

The effect of different kinds of physical activity upon the mentality of the individual is often discussed by writers upon education. Though many of them attribute to bodily exercise some responsibility for general mental training, its degree is very differently estimated. "A healthy mind in a healthy body"—especially if it be said in Latin—sounds more impressive to a Speech-Day audience than to psychologists and physiologists. To them, indeed, it is but a loosely-strung couple of challenges to analytic thought and many-sided research, for to determine the conditions of mental and bodily health should be one of their chief aims.

Although, however, our scientific knowledge of this great subject is at present so sparse, the claim seems justifiable that certain didactic systems widen or train the mind by virtue of the fact that they promote the cultivation of muscular "knowledge." To what extent the ordinary non-muscular knowledge which is incidentally acquired by the pupil during such learning widens and trains the mind is not the present problem, which is to investigate the muscular knowledge which such systems bestow. Examples will readily occur to the reader; some typical ones are handwork, the training of the "muscular sense" by the Montessori method, eurhythmics, dancing, musical performance, painting, in

fact all the arts which demand delicate co-ordination of movements.

What is Intellect?—The word intellect has been used in many senses, of which at least two are important in this connexion.[1] It may cover all forms of cognitive events, in which case intellection becomes merely the equivalent of cognition. On the other hand, it may designate the processes of elaboration which the mind applies to its material, and in particular that kind of elaboration which leads to conceptual thinking. The point of view which this chapter seeks to justify is that, in both these senses of the word "intellect," muscular skill has a higher intellectual value than is usually assigned to it, and that this value is susceptible of being increased considerably.

We may first inquire whether such skill can justifiably be described as intellectual.

Bodily skill, or the ability to deal with the world by means of one's muscles, joints, and tendons, carries with it a specific and unique kinæsthetic knowledge. This knowledge can obviously be called intellectual in the first sense mentioned above. Yet it is as incapable of perfect translation into the terms of another sense as is music into colours or words, for as we shall see, it possesses scarcely any words in its own right. Many persons therefore require to make a mental effort in order to realize that, in spite of its comparative wordlessness, kinæsthetic knowledge may form a basis for conceptual thinking, thereby establishing a primary claim to be called intellectual in the second sense of the term. The peculiar nature of such knowledge, however, raises certain difficulties when it is dealt with from the psychological aspect. These will be described later.

[1] Cf. Baldwin's "Dictionary of Philosophy and Psychology."

Kinæsthesis is usually accorded scant respect by the world of intellectuals, as we know them to-day. Classed with the "lower" senses, it is contrasted with the "higher" senses of sight and hearing.[1] Though such a division seems justified at present its utility is possibly over-estimated.[2]

Some Problems Stated.—It is now possible to suggest a number of questions which arise from these considerations. Some attempt at answering them will be made in this chapter.

1. Do not most educated persons regard the intellectual value of kinæsthesis as slight?

2. Is such an attitude justified, in the light (*a*) of primitive man's early development,[3] (*b*) of certain present tendencies in social behaviour?

3. What are the chief factors which have brought about this attitude?

4. Is the discovery of these factors likely to help in predicting future developments in man's mentality?

5. Is an intellect, the foundations of which do not include contributions from the "higher" senses of sight and hearing, necessarily inferior to that of the normal person? If so, in what respects? May it, on the other hand, even be supernormal in some directions?

[1] Cf. E. B. Titchener, "Textbook of Psychology." New York, 1911, pp. 114 f.

[2] Perhaps Professor T. P. Nunn feels this when he writes kindly of the "humbler" senses. Quoting Miss Margaret McMillan, who says, "The patience of the poor is not all patience. It is largely insensibility," he adds, "To such children a shower-bath, with its powerful appeal to dull senses and flaccid muscles, may mean a veritable beginning of intellectual and moral enlightenment."—"Education, its Data and First Principles." London, 1920, p. 164.

[3] The chapters on "Tactile and Motor Impressions," in F. Wood-Jones's "Arboreal Man" (London, 1918, pp. 157-73), are full of suggestions upon this subject.

6. Would it be possible to increase the present intellectual value of kinæsthesis by extending man's conscious appreciation of the different modalities and qualities of the group of sensations which compose it?

The Loose Connexion of Kinæsthesis with Language.— In the following pages no attempt will be made to discuss the question, whether kinæsthetic *images* really exist, or if all so-called images of kinæsthesis are in fact actual, though faint, sensations.[1] For the sake of convenience, however, and for no other reason, the words "image" and "imagery" will be used in the ordinary way.

Man's memory of his own movements as they felt to him at some earlier time is a subject of which comparatively little study has been made. To speculate why might lead to interminable discussion of a host of possible causes. Prominent among them, however, is the difficulty of finding comprehensive and comprehensible ready-made names by which these experiences could be described to others. Almost as impressive is the fact of their faintness, vagueness, and comparative unimportance in the lives of many leaders of thought, whose intellect has often been erected almost exclusively upon foundations provided by those aristocrats of sense, sight, and hearing. Yet it is not a biological necessity that man should be endowed with these two senses. One can conceive him as existing without them, and, in consequence, attributing more importance and paying greater respect to kinæsthesis[2]; even as she who writes:—

> The delicate tremble of a butterfly's wings in my hands, the soft petals of violets curling in the cool folds of their

[1] Cf. pp. 26-9.

[2] Throughout this chapter the simultaneous occurrence of cutaneous sensation with kinæsthesis is assumed.

leaves or lifting sweetly out of the meadow-grass, the clear, firm outline of face and limb, the smooth arch of the horse's neck and the velvety touch of his nose—all these and a thousand resultant combinations, which take shape in my mind, constitute my world.[1]

And the chief denizens of this world must inevitably be the experiences of touch and kinæsthesis, for Helen Keller never heard a sound in her life, and the vision which illuminated her early days flickered out in a year, leaving but a few faint gleams in her memory. Yet, she tells us :—

> With the dropping of a little word from another's hand into mine, a slight flutter of the fingers, began the intelligence, the joy, the fullness of my life.
>
> My world is built up of touch sensations, devoid of physical colour and sound, but without colour and sound it breathes and throbs with life. Every object is associated in my mind with tactual qualities which, combined in countless ways, give me a sense of power, of beauty, or of incongruity, for *with my hands I can feel the comic as well as the beautiful in the outward appearance of things*. Remember that you, dependent on your sight, do not realize how many things are tangible. . . ."
>
> The hardness of the rock is to the hardness of wood what a man's deep bass is to a woman's voice when it is low. What I call beauty I find in certain combinations of all these qualities, and is largely derived from the flow of curved and straight lines which is over all things.[2]

The ludicrous, too, is felt by her in "the bulge of water-melons, the puffed-up rotundities of squashes." But her amazing insight—the word is not permissible here, but we have no other—into realms which seem to many to be explorable only through sight and hearing, may easily distract attention from an important consideration. Helen Keller was educated by and obtained

[1] Helen Keller, "The World I Live In," p. 6.
[2] *Ibid.* pp. 5 and 7.

her language from persons whose knowledge of their own world had been received chiefly through the channels of sight and hearing. It seems clear, therefore, that the terms of her language, while often merely analogical, are just as often almost meaningless if regarded as descriptions of fact. The words "ruddy" and "dissonance"; the statement "I know how budding trees look" can have no direct sensuous meaning for her.[1]

Perhaps we may be allowed—though it seems scarcely permissible—for one brief moment to adopt towards this life-history the detached attitude of the scientist. At once a speculation forces itself forward. Only by the devoted efforts of her teacher and friends was her mental development made possible; yet to what extent did this assistance cause her mind to deviate from the path which we may imagine that it might have taken for itself, under impossibly ideal circumstances of protection and companionship?

Let us suppose for a moment that, while being sheltered from the rigours of life, she had developed ideas both simple and complex about her world chiefly upon the basis of kinæsthesis, and with no reference whatever to sight or hearing. We may now further imagine her, having constructed a mental world quite different in quality from that of the ordinary person, to have been entrusted completely and exclusively with the bringing-up of another child, also lacking vision and hearing, who, in turn, had become the educator of still another. Gradually these references to sight and hearing, as analogical as our own attempts to picture the

[1] ". . . a venturesome spirit impels me to use words of sight and sound whose meaning I can guess only from analogy and fancy" (p. 45).

waves of wireless telegraphy, would have faded away, leaving a structure of knowledge which would be the unique possession of the congenitally blind-deaf; unique not only in the nature of its fundamental sensation material, but also in the degree of perfection attained by its functions. Moreover, in many of those adjustments to environment in which these attainments entered into competition with those of any ordinary human being, they would have proved to be superior.

The Significance of Individual Differences in Kinæsthetic Imagery.—The evidence derived both from the comparison of the introspection of different individuals, and from experiment, makes it clear that the kinæsthetic imagery of different persons is characterized by very considerable variations. Some people appear to possess kinæsthetic imagery of a degree of excellence comparable with the common cases of well-developed visual memory. Yet up to the present there have been few to collect the details of such gifts. The earlier *questionnaires* gave their answers comparatively little opportunity to record this kind of imagery. Even if they had done so, the "motile"—to use a somewhat old-fashioned phrase—would have found it difficult to express himself in words, except of course when describing the processes of speech or writing. Important as these inquiries undoubtedly are, they teach us almost nothing concerning the mental life of the "muscular man," and much more investigation is needed into the kinæsthesis of the larger musculature and of the body as a whole.

Until more is known about the characteristic individual differences in kinæsthetic memory, we must content ourselves with speculations based upon other spheres of imagery, aided by our casual self-knowledge. With this warning in mind, the somewhat bold speculation may be made, that kinæsthetic memories may

differ in their vividness, clearness, " constancy," or unchangeableness, readiness for use and ability to carry meaning.

The task of assessing all these characteristics would not be easy. It is obviously more difficult than in the spheres of sight or hearing. For the person who describes visual imagery may command all the subtle shades of significance with which centuries of language and literature have provided him ; for the recorder of auditory memory the whole notation of music and the rich resources of physics are ready to help him to hammer out as thinly as possible, and then to nail down, the edges of his meanings. But where is the notation of action ; where shall we seek for the grammar, the syntax, and the theory of harmony of bodily movement ? Perhaps some beginnings of them lie in the basal ideas, many of them as yet scarcely explicit, of manual training, of eurhythmics, of folk-dancing, and of " motion study." Certainly their material lies tantalizingly hidden in the minds and bodies of Anna Pavlova, of Annette Kellermann, of C. B. Fry, and W. T. Tilden. But whether these happy mortals, when they move, are making poetry without knowing it ; how far their perfection is the result of hard-won synthesis and to what extent it is a delicate natural polish which self-analysis would crack ; of these things we—and possibly they—know almost nothing.

But while we marvel delightedly at the grace of their movements, perhaps feeling in ourselves the while feeble and faint tendencies to copy them, the sight suggests another psychological question. May the pre-eminence of these persons be closely connected with their ability, on seeing a new movement, to register and subsequently to recall it directly through their kinæsthesis, and not through the aid of any intermediate imagery, like that

of sight? May it be that the number, vividness, clarity, readiness, and meaning-carrying capacity of their kinæsthetic images enable them to learn a new movement in swimming, dancing, fencing, or skating, as easily as a first-class visualizer may take in details of a picture after one brief glimpse, or as Mozart wrote down from memory the "Miserere" of the Sistine Chapel after hearing it twice?

This seems to be possible, for before a new co-ordination of movements can be learnt by most ordinary people they find it necessary to overcome something very like a pronounced physical and mental resistance against placing their limbs or body in this particular position. They feel as if, in order that the new movement shall be learnt, it were necessary to blast a path through some stratum of high resistance in the neuro-muscular system. Often, moreover, once this newly taken-up bodily position has been abandoned, many unfortunates can evoke no genuinely kinæsthetic memory of it, and so, in order for it to be learnt, it has to be assumed a wearying number of times. As a stepping-stone to these new achievements they resort to visual or verbal aids, or use both together; they picture the arm or leg in a certain position before putting it there, or they anxiously mutter, quietly or audibly, some exhortation given by their teacher, "follow through," "watch the side-line," "bend the knee," "right shoulder forward."

It is almost certain, however, that at least some persons, endowed with well-marked kinæsthesis, remember their new movement from the very beginning in the same "language" in which they will eventually wish to express it, in the wordless language of kinæsthesis. And in doing so they ensure their greater success in more than one way. Obviously they save their own and the instructor's time. But loss of time

is not the only annoying feature of a *bureau de change;* the value of the foreign currency with which one emerges is always less than that paid in, by the amount charged for changing. And this depreciation of meaning, when knowledge gained in one sense-sphere is translated into the language of another—so vividly realized when one reads the "meaning" of a great symphony which a concert-programme description vainly attempts to convey, or hears the musical "representation" of a sea-scene—is at least as great in the case before us.

In order to illustrate these and other facts, some examples from my own experience may perhaps be admissible. By way of preface, I will mention that the variety, range, readiness, and plasticity of my visual imagery seem to be inversely matched by the paucity, narrowness, and "stickiness"[1] of my kinæsthetic equipment.[2] The following observations are taken from my notebook, with a very few minor corrections of obscurities due to the clumsy wording of notes written hastily:—

> At noon to-day I finished an elementary lesson in figure-skating, during which I had found considerable difficulty in getting the "feel" of the various muscular co-ordinations—chiefly concerned with feet, knees, and hips—as described and exemplified by the instructor. At 6.30 the same evening, while writing these notes, I tried to recall, in kinæsthetic imagery, the morning's lesson on the "back outside edge." In spite of all my efforts, the recall persistently came in the following terms:—
>
> A very clear visual image of the instructor, seen facing me at the distance of a foot. The clearest part of the image was the top of his head, the next clearest his face and his smile,

[1] This characteristic is described on p. 219.

[2] How far such lopsidedness of imagery development is attributable to heredity, to environment or to both is a psychological question which often arises in a practical form. It is usually ignored or begged.

and the upper part of his body. The image pushed itself into consciousness almost to the exclusion of everything else, and the utter inability of such an experience to assist, in any way, a person learning to skate is too obvious to require further emphasis.

With an effort on my part there then came another visual image of the instructor's skating-boot executing a back outside edge. This boot, if not firmly held in check, began to focus itself into details such as the pattern of lacing, scratches, and an occasional patch on the side. At no time did even a visual image of my own boot come into consciousness, probably for the very good reason that I had been forbidden by the instructor to look at it.

The only kinæsthetic imagery which could be recovered at this time (i.e. 6½ hours after the lesson) was a very faint and feeble image of scratching the ice with the toe of the skate; i.e. an image of a movement which I had been expressly forbidden to make.

At another time it was recorded that "any number of visual images of the instructor in any position can be obtained and these must be retranslated mirror-wise into visual images of my own body before they are of any use."

A further extract from notes written on the same evening as those first quoted may make another point clear.

In trying to remember a particular skating movement which involves keeping the right shoulder back, I "see" my own shoulders much more easily than I can "feel" them in the right position. I visualize quite clearly my right shoulder when it is held back, including even the part of the (brown) coat which covers it, quite regardless of the anatomical impossibility of seeing my right shoulder when my eyes are looking over my left. When the instructor shows me how to execute a new movement, I am naturally inclined merely to admire him passively as a moving picture (after one evening's skating I had continual visual images of him in all kinds of skating positions before I went to sleep) but, unless I force myself to do so, I get no muscular imagery while I am watching him demonstrate a movement.

How then do I learn to skate at all? In so far as any

progress is made, it appears to be[1] through visualizing myself and others performing the movement in question. The images are very clear though not vivid; they are like a clear well-taken carbon photograph, or like a sketch made with an H.B. pencil, and therefore grey. When taking a lesson I tend to look on at the whole performance as a passive spectator, just as if I were watching a stage dancer, and only occasionally do I remind myself that it is my lesson, and that therefore I must do something more than merely looking on.

It is very easy for me to attend to the look of the performance; it is correspondingly hard to attend to the "feel" of it;[2] it is as if the nervous energy had to blast its way through some resistive stratum of the brain. This illustration of blasting one's way is perhaps supported by the fact that the "feel" of a new movement, when it does arrive, often comes quite suddenly. Perhaps Dr. Montessori may be describing some similar experience when she writes of the "writing explosion"; the sudden discovery, often attended with great excitement, by her little pupils that they are able to write.

In learning a dance there is, too, the same tendency to attend to the look and not to the "feel" of it. In order to learn any new dance I must go behind the demonstrator and see the position of the person's feet, just as if they were my own. I must then place my feet in the same position (imaged visually if the demonstrator is absent) attending very carefully to the "feel" of the position.

Lastly, I might mention that though my muscular memory for movement is so poor, vague, unready and "sticky," my sense of balance appears to be normal; e.g. I have noticed that keeping my balance in a new position, or deliberately falling from a new position, presents few difficulties to me.

[1] (Note added subsequently): "Or rather, 'one important factor appears to be.'"

[2] This reminds one of the fact that, on injury to the post-Rolandic convolutions of the brain, a patient may lose his power of attending to his touch sensations while retaining that of attending to everything else. Might it be that in the case of the person whose kinæsthetic imagery is undeveloped some corresponding part of the brain has never been properly "opened up"? (Cf. footnote on p. 219.)

I should not be surprised to discover that the apparent paucity of my kinæsthetic images is due, to a considerable extent, to their "stickiness" or general agglutination, by which words I mean to indicate :—

(*a*) The lack of clear-cut differentiation between different combinations of imaged movements, especially if they are somewhat similar. It seems to me, as a visualizer, comparable to the lack of differentiation which would exist in the visual imagery of an uneducated person, attempting to recall, let us say, a series of differently shaped human skulls which he had seen; while in the imagery of a visualizing anthropologist these distinctions would be prominent. I imagine that in a first-class athlete, especially in one who plays well several somewhat similar games, e.g. tennis, lawn tennis, and badminton, this differentiation (which, of course, is one of the first necessities for thinking) has gone on to a much greater extent than in myself. Perhaps it is comparable to a good actor's power of speaking the same sentence successively in several different dialects of the same language.

(*b*) The fact that my kinæsthetic images seem—if it is not unsafe to use a pictorial metaphor—difficult to coax out of their holes. Perhaps it is that they are not only faint, but extremely fleeting (like the visual images which Dr. Rivers describes as forming part of his experience when awake[1]), and that only after many efforts can one get a grip on them.

These examples[2] may help the reader whose imagery tends predominantly towards the visual or the kinæsthetic type to realize the great difference between the

[1] "Instinct and the Unconscious." Cambridge, 1920, p. 11 f.

[2] When I wrote these notes, I was unacquainted with Professor Washburn's book, "Movement and Mental Imagery." In connexion with my own ease of attending to the "look," and difficulty in attending to the "feel" of a muscular performance, her discussion of the relation of differences in imagery-type to "individual differences in the appeal of certain kinds of stimuli to attention" (p. 43 f.) is helpful, while Professor Wood-Jones's statement (op. cit. p. 171): "It is perhaps not beyond possibility that the full lodgment of all pictured movements (his term for kinæsthesis) is not yet permanently effected in all human brains, and that the process is still in progress" is hopeful.

kinds of mental apparatus with which different persons may attempt the same task. The utter irrelevance and futility of many of the visual images recorded in the notes are worthy of special attention. Some of these images were not only useless but their presence may have obstructed any incipient attempts to learn in the direct way. For example, visualizing the upper part of the instructor's body seems scarcely likely to have assisted in any way whatever; visualizing one's own skating-boot may have been a little more helpful, though this is doubtful.

It is, however, impossible to be satisfied with any simple belief that visualization is valueless in learning muscular co-ordinations. Many visiles cherish those diagrams and pictures which, though they are sometimes execrable, both in conception and in execution, often form almost the only intelligible information in many books which profess to describe how to play any particular game. After a glance at such illustrations the visile may carry away, once and for all, the gist of a wordy explanation which may never have been clear even to its writer.

The "Intolerance" of Persons with Predominant Kinds of Imagery. The Utility of Visual Imagery in Learning Muscular Co-ordinations.—It is very common to meet with athletes who maintain stoutly that books are of no use in learning a game. If by this be meant merely that books are useless if not supplemented by diligent practice, the remark is so obvious as to be uninteresting. If it means that many existing books on games are bad, the psychologist's interest in it becomes a little keener. But in the mouths of some people the assertion illustrates a most interesting and important psychological phenomenon; the mutual intolerance, arising from ignorance, of people with different types of mentality.

This fact was not missed by Galton, who writes of those men of science to whom visual imagery was unknown :—

> They had no more notion of its true nature than a colour-blind man, who has not discerned his defect, has of the nature of colour. They had a mental deficiency of which they were unaware, and naturally enough supposed that those who affirmed they possessed it, were romancing.[1]

This attitude is often very strikingly shown (though its results and implications are, probably, not yet sufficiently realized by psychologists and others) by visiles towards motiles, and vice versa. The visile often finds it almost impossible to realize how a motile can ever recall in any terms other than visual images an experience which, it would seem to the visile, "ought" to be naturally recalled in such imagery. The motile has similar difficulties of comprehension. (It is more correct to write that these difficulties would arise in the improbable event of such thoughts occurring to either of these persons.)

For those readers whose predominant imagery does not happen to belong so exclusively to one of these two classes, a few examples may illustrate the importance of this intolerance. Perhaps I may be allowed to begin with the type to which my own mind conforms ; the visile. For me visualization, not only of obviously pictorial experiences, but even of abstract and general meanings, in the form of similes, metaphors, analogies, and semi-diagrammatic pictures,[2] is so ubiquitous that

[1] "Inquiries into Human Faculty." Pp. 58-9.

[2] There is, usually, no *conscious* attempt to picture such meanings. They simply "are there." Sometimes they are adequate to the meaning, often they are mere caricatures of it. But like most caricatures they usually cause me to realize with especial intensity some salient point, and not always one which is welcomed.

I frequently forget that many other people do not visualize with the same degree of facility or viciousness. It is unfortunately a somewhat common experience for me to realize, after having lectured to a class for some considerable time, that I have made no attempt to transfer to the blackboard any of the mental diagrams which I have been using. Such outward behaviour might perhaps be interpreted by others as indicating poverty rather than profusion of visual imagery in a lecturer's mind. On the contrary, however, visual imagery of diagrams is so prevalent with me that I have often to remind myself that in order to transmit even an approximately faithful rendering of my meaning to others, I must make my thinking "visible."

Many visualizers too, never realize, or refuse to believe that complicated behaviour and thinking may go on in others without the slightest trace of visual imagery. From conversation with some of my friends who have predominant kinæsthetic imagery it seems to me certain that a similar forgetfulness of the peculiarities of others characterizes many motiles, especially those whom kinæsthetic processes—in particular, perhaps, those of language and gesture—seem to be so prominent in their thinking that they have written of the "fiction of visual imagery."[1] In fact, the possibility of any real *rapprochement* of the visile and motile seems at present to be remote, for the following reason. While the visualizer's power to express to another person his experience of visual imagery is limited only by his capacity for psychological observation and for using his mother tongue, which has chiefly been developed to describe the seen world, the motile is less fortunate, in

[1] The question is discussed in greater detail in the "British Journal of Psychology," 1920, xi. 1, 77-9.

that very few of his characteristic inner experiences[1] are expressible in language at all.[2] For the function of many words relating to bodily movement is merely to describe its visible aspects, seen by others or by its initiator. Some words, moreover, refer less to the bodily movement itself than to that of some instrument moved by the person, or, even more remotely, to some object propelled by this instrument. English out-door games illustrate especially well this tendency for the reference of the term to creep farther and farther away from the initiating limbs. For instance, I take it that such a term as a "late cut" in cricket may conceivably refer to any or all of the following separate events:—

(*a*) The genuinely personal experience; kinæsthetic, visual, tactual, etc., of the batsman;

(*b*) The movement of the body and arms and of the bat, before and after it strikes the ball (1) as seen by the batsman, (2) as seen by the spectators;

(*c*) The behaviour of the ball after its impact with the bat.

An indispensable preliminary to the construction of any satisfactory psychology and any really expressive language of kinæsthesis will be a distinct separation in thought of all those events which occur outside the agent's skin from those which take place inside this envelope. Until that is achieved the motile will remain, as he is at present, inarticulate. For of the recognized phrases describing action many bear a spectacular or

[1] I venture to call the reader's attention once more to the significance of this word "inner," which was emphasized on p. 28.

[2] Or, as a "behaviourist" might perhaps express it, speech habits are not closely connected with the functioning of the muscles, joints, and tendons.

"behaviouristic" rather than a psychological meaning, describing the experience of the looker-on, not of the performer, while not a few carry a depressingly complex and unanalysed mixture of both.

It is probably the ability of the motile to recall a new movement "in his muscles," after having performed it but a few times, and connected with this, his inability or disinclination to visualize how his body looks when placed in the position required, which leads him to say that reading books on a game is of little use in learning it. If by this is meant that one cannot learn a game without performing the muscular actions which it requires, it is a platitude. But if, on the other hand, the motile means that for him photographs, diagrams, and diagrammatic pictures, to say nothing of the slowed-up cinematograph representation, and the tri-dimensional wire model of a movement, are of little or no use to him, he expresses very clearly his difference from the visile. For from a really intelligently drawn diagram the latter can often learn in a flash what he has been trying for weeks to discover from watching an actual demonstration. Eventually, of course, he must translate this visual experience into kinæsthetic memories of the movements as they were actually carried out by himself. In this respect therefore, he is at a disadvantage; comparable, perhaps, with that of a person who knows a language but cannot think in it. But whether in the highest flights of any branch of games, the use of a good book does not become essential for rapid progress is still a question well worth asking.

Is a "Language of Kinæsthesis" Possible?—We must now inquire whether such a language of kinæsthesis is conceivable, and if so, how it might arise. An attempt will be made to sketch an approach to this problem, and to speculate how, neglecting for the moment

practical difficulties, such a language might conceivably be formed.

To the utmost possible degree it should be rid of analogical references to other senses. Sight has one language, hearing has another. Cross-references, such as the colour of a voice or the key of a landscape are, statistically speaking, so rare that they do but call attention to the normal self-sufficiency of these two notations. Kinæsthesis, then, would have to renounce its present bad habit of borrowing terms from the other senses, and botching make-shift tools out of them. Ideally, a visual or auditory term, used in a description of motor experience, would appear unambiguously in its own right.

Supposing it to be possible to furnish descriptive words for different kinæsthetic experiences, it would then be necessary to discover elementary or *quasi*-elementary movements of groups of muscles which are of fundamental and outstanding importance in some branch or branches of industry or physical exercise. Here one can offer only tentative suggestions as to how this might be done. Search might be made amongst existing manuals of drill and physical training, of eurhythmic exercises and of physical culture systems.[1] Anatomists and physiologists might give valuable information concerning those important bodily movements which, structurally and functionally, are relatively simple. In this way there might be isolated from others, so that they could be fairly strictly defined, a hundred simple, elementary, and typical attitudes of body and limbs. Persons could then be taught to take up these positions

[1] The writer's present acquaintance with the Ling and other systems is insufficient to justify any opinion being recorded here concerning the extent to which a scientifically satisfactory beginning has been made in this direction.

again and again, carefully and attentively, until the descriptive names given to them had associated themselves with definite kinæsthetic experiences.

Such a plan does not seem wildly impossible. In fencing, golfing, cricket, figure-skating—to take only a few cases—definite stances are learnt. In the last-named exercise, "new" positions and movements appear to be deliberately composed of definite elementary groups which have been previously given standardized names and consciously realized in experience. All such lessons involve the isolation, from thousands of possible muscular combinations, of some, which for a particular purpose, are fundamental. Perhaps, some day, with the assistance of anatomy and physiology, it may be possible to define more strictly the fundamental groups for any special purpose.

Supposing, then, that the important elementary or essential experiences in the world of kinæsthesis had been isolated and labelled, so that agreement exists concerning their meaning; the next step would be to classify them more scientifically—for of course some degree of classification will have taken place already—into categories. Just as in the language of sight there are divisions of words into those representing colours, forms, directions, sizes, etc., so there might be a subjective or psychological classification of man's most important movements. While gross divisions of the movements, corresponding to limbs, fingers, etc., will already have been achieved, it is obvious that some compromise between such a classification and that based upon anatomy and physiology may be necessary. The most useful final grouping might conceivably be guided exclusively by anatomical and physiological considerations.

At this point the reader will naturally and justly in-

quire why, if such a badly needed kinæsthetic language is theoretically possible, it is not already in existence. He may draw the conclusion that there must be some insuperable difficulty which the writer has not taken into account. This may be the case. But, until recently, one valid reason for the non-existence of any satisfactory objective analysis, classification, and standardization of human movements (and, therefore, of human kinæsthetic experiences) was that usually no two persons could agree not only as to the exact motions which ought to be made for any particular purpose, but even concerning the movements which they themselves had made a moment previously.[1] For most human movements are so very complicated, rapid, and individually different that even an unusually favourable combination of natural aptitude and special training in observation cannot ensure a faithful account of them.

The Importance of "Motion-Study" in this Connexion.— But the last few years have seen a great increase in the number and variety of successful attempts experimentally to record the behaviour both of man and of animals. One of the most interesting branches of this work is that known as "motion-study." It has developed, and is still improving, apparatus which, freezing in mid-air, so to speak, the path of any movement, records it permanently by means of a photograph or tri-dimensional wire model, painted in a special way to represent not only the direction of any component movement but also its relative and absolute velocity.[2] Such models will

[1] Disputes as to whether a particular golfer moved his head at a certain moment are not unknown in club houses. Unfortunately it is quite likely that the person whose evidence is of least value in this connexion is the player himself.

[2] For description and photographs see F. B. Gilbreth, "Motion Study," New York, 1911; "Fatigue Study," London, 1916; "Applied Motion Study," London, 1919. A concise account of

make it impossible in future for there to be two opinions concerning the exact orbit which any limb has described in executing a set of movements.

It seems therefore not inconceivable that as a result of careful motion-study of various occupations there may be built up notations both of objectively seen movements, and of the kinæsthesis corresponding to them. The words used would then refer (*a*) to the objectively demonstrated movements — photographed, cinematographed, or "motion-modelled," (*b*) to the kinæsthesis experienced when these movements, and these movements only, are made.

The advantages of such objectively controlled terms are clear. A name given to a kinæsthetic experience would relate to the "inner" feeling of some movement, set of movements or attitude the nature of which had been objectively demonstrated so that its meaning would be constant for every one. Such a movement could be carried out again and again until its "feel" became unmistakable. Related movements might be given related names. Movements common to several occupations might be analysed out and their relations to these different functions studied, as Mr. F. B. Gilbreth has suggested. In the hands of skilled and educated teachers, the supplementary teaching of movement by pictures, diagrams, models, and the slowed-up cinematograph might then become really effective. Illustrative diagrams of movement, obtained by the use of the apparatus of motion-study, would really represent and not caricature the motions which they profess to depict. This would inevitably lead to the detection of the less desirable methods of carrying out any movement, and therefore, again, to increased skill,

motion-study, with illustrations, is given in chapter i. of C. S. Myers's "Mind and Work," 1920, pp. 2-35.

or kinæsthetic knowledge. Not only would the status of such knowledge be raised, but also the status of those persons who, through their teaching, aid in its acquisition and development.

Improvement of the Social and Intellectual Status of Kinæsthetic Knowledge.—In a psychological discussion of this subject it is obviously relevant to comment upon the present disparagement, by an influential section of the community, of kinæsthetic knowledge. The tradition that knowledge worth having is almost exclusively confined to that which has reached us through our eyes and ears has been confirmed and hardened by the powerful mechanisms of class distinction and class tradition, and by generations of a certain type of teacher in school and university. To such influences the ordinary man owes his view of culture. From most people, therefore, the motiles, as compared with their socially-established brothers, the visiles and audiles, seldom get fair play. The two latter groups, themselves recognized as belonging to a kind of *intelligentsia*, not infrequently fall into the bad habit of regarding with some contempt all persons whose motor activity is expressed through channels other than the socially-approved ones of speech and writing.[1] A vicious circle is thus made; many intelligent persons are never encouraged to contemplate the study of such non-verbal occupations, and not a few are actively prevented from taking them up. This is one reason why the intelligent professional in sport, the intelligent handwork instructor, and the intelligent teacher of games are still so much of a rarity that when they do appear one never fails to remember them. If

[1] Mr. Bertrand Russell has placed on record his suspicion that what people should mean by intellect is simply "certain habits in the use of words," and his lack of "mystical reverence for these habits" ("Mind," xxix., N.S. No. 116).

the knowledge obtainable through kinæsthesis were increased and transmitted to others in the best and quickest ways by teachers who were themselves good performers, their social status would rise. But this is the less important consideration; their intellectual status would be improved too. By increasing their kinæsthetic experience, they would not only have gained deeper knowledge of a comparatively new aspect of their world, but such knowledge might form basic material for the elaboration into concepts which characterizes intellect in the second sense of the term; the process by which we acquire the knowledge of truth as distinguished from the knowledge of facts.

I have attempted elsewhere [1] a crude analysis of the process of thinking. Its essence seems to be the recall of past experiences, abstraction of their relevant aspects, their comparison, re-comparison with some aim in view, combination of the results of this comparison into a "new" conclusion, and the expression of this conclusion in action, gesture, speech, or writing. All this happens so regularly when its raw material is formed by visual or auditory experiences that many people are apt to forget that this series of processes may be carried out just as successfully upon the basis of touch and kinæsthetic memory.[2] Few would have the hardihood to object that in such a case the processes were not intellectual. If they did, Helen Keller, with her university degree and her literary achievements, would provide the answer.

Some Further Speculations.—The relation of these

[1] "British Journal of Psychology," 1920, xi. pp. 71-4.

[2] May it be that really superlative excellence in games or manipulative labour is distinguished from mere goodness by a much greater degree of development of the process of working up the raw kinæsthetic material into new combinations; a particularly good example of "kinæsthetic intellect?"

considerations to the doctrine of *Bewusstseinslagen* or "conscious attitudes"[1] is obvious and interesting. It seems certain that the thinking which goes on in the possessors of a rich and pliant kinæsthetic memory tends to be strongly influenced by such conscious attitudes, perhaps to the discouragement of visual and auditory images. How far the left wing of "behaviourism" is constituted by psychologists with this type of mentality, whether, consciously or unconsciously, they contemn the visual-auditory intellect in much the same way that many intellectuals contemn the kinæsthetic variety; to what extent and in what ways these different kinds of mental apparatus may assist in the formation of those different attitudes towards life which are called introvert and extrovert[2] respectively; the rôles which different kinds of imagery play in æsthetic appreciation, in the causation and the cure of mental disorders—all these problems are related to this subject, and study of them has scarcely yet begun.

[1] Cf. E. B. Titchener, "Experimental Psychology of the Thought Processes," pp. 98 f., 180 f.

[2] Cf. C. G. Jung, "Analytical Psychology," pp. 287-98, and "Psychologische Typen," Zurich, 1921.

CHAPTER XIII

THE SIGNIFICANCE FOR THE PROBLEMS OF REMEMBERING AND FORGETTING OF CERTAIN EXPERIMENTS ON THE NERVOUS SYSTEM

IN these few pages the almost hopeless task must be attempted of conveying in a few words the significance for our problems of the neurological work of Dr. Henry Head, Dr. Rivers, and their collaborators.[1] First the experiment in human nerve division, carried out in 1903, will be described.[2]

Certain cutaneous sensory nerves in Dr. Head's arm were divided, and the sensations which returned during its gradual healing were compared with those which existed before the operation. At a certain stage of recovery, the ability to appreciate warmth, coolness, and light touch, and to distinguish two neighbouring simultaneous touches from each other, was absent from a particular area. Stimuli between about 26° and 37° C. produced no thermal sensation, while below or above these limits the sensations experienced were diffuse and

[1] H. Head and others, "Studies in Neurology." London, 1920. Full accounts of the experiments mentioned on pp. 157-58 of the present book will be found in these studies.

[2] I have been helped by the short accounts of this experiment given in C. S. Myers's "Textbook of Experimental Psychology," pp. 11-14, and "Introduction to Experimental Psychology," pp. 36-44.

tingling, and their intensity was apparently independent of the degree of heat or cold.

This "protopathic" state of sensibility, with its absence of graduation, characterized the greater part of the affected cutaneous area, but a small triangular patch was found in which the sensations of heat, cold, and pain were absent while sensibility to warmth and coolness and the diffused sensibility to light touch remained. This latter state was called "epicritic," because its special feature is the power of correct localization and discrimination of simultaneous cutaneous stimuli; the protopathic state being considered more primitive than the epicritic.

Two distinct systems, either of which may appear alone, divorced from the other, are therefore involved in the sensibility of the normal skin, and these investigators believe that these two systems have been acquired at different times in the evolution of cutaneous sensibility.

The Relation of this Work to the Problem of the Function of Imagery.—It is obvious from their writings that certain characteristic features of the mental apparatus of Head and Rivers made their co-operation peculiarly desirable and fortunate.

> Head's mental processes are based upon visual images to a remarkable degree. Every thought is in some way bound up with internal vision, . . . he corresponds to the common group of strong visualizers who learn to depend so exclusively on visual images that all other less dominant faculties of sensory reproduction fall into disuse.[1]

About Rivers's imagery we have already learnt some important facts on page 54. In particular it should be remembered that he was not devoid of imagery, but had direct and frequent experience of it in dreams.

[1] Head, op. cit., i. p. 243.

This is mentioned here because the conclusions which Head has reached concerning the manner in which bodily postures are perceived, and the rôle of imagery in such perception, may prove to be at variance at least with the terminology, if not with the theoretical standpoint, of chapter xii. in the present book.

Not being competent to deal with this complex question I have thought it best to record here the possibility of this variance.[1]

The view of posture-perception referred to will appear from the following quotation from Dr. Head :—

> The cortex has been said to be the repository of "images of movement." This is, however, an unsatisfactory term when we consider the actual effects produced by a cortical lesion ; for when we speak of an image we mean something that can be recalled into consciousness under suitable conditions.
>
> When we sit immobile and imagine our fingers touching some object on the table, many of us see at once the mental picture of an outstretched arm ; the only image in consciousness is a visual one. Now if we examine an intelligent patient in whom the power of recognizing posture or passive movement is gravely affected, this visual image may remain as vivid as ever. In such cases it is possible to make the following instructive experiment. Place his arm in front of him on the bed, allowing him to see the position in which it lies ; touch several spots in succession on the affected hand and ask him to point to them with his finger, his eyes remaining open throughout. Then close his eyes and carefully remove the arm into some distant position, say at right angles to the bed. If he is a strong visualizer he will tell you that

[1] Dr. Rivers wrote to me recently, that though he did not object to any part of chapter iv. on "The Functions of the Image," he felt that more will be learnt about this subject along the lines described in Dr. Head's writings. Moreover, his opinion was that if kinæsthetic imagery exists (which he doubted) it is of an order different from that to which visual and auditory imagery belong.

he can still see the picture of his arm and hand as vividly as before on the bed in front of him. Now touch some point on the hand ; if tactile localization is not too grossly disturbed, the patient will indicate a spot in the position where that part of his hand originally lay on the bed. This phenomenon may be called "exploration of the phantom hand." Here the visual image of the limb remains intact, although the power of appreciating changes in position is abolished.

It is evident therefore that the standard to which immediate reference is made, when a fresh position is recognized, cannot be a visual image. The existence of normal human beings, whose conscious life by day is devoid of all visual images, would be sufficient evidence of this fact, apart even from the direct results of experiment in cases of cortical lesions. Some such persons undoubtedly possess true movement images. That is to say, the assumption of an imagined posture may be accompanied by representation of movement, equivalent to the pictures of those who visualize strongly.

But in both cases the image, whether it be visual or motor, is not the fundamental standard against which all postural changes are measured. Every recognizable change enters into consciousness already charged with its relation to something that has preceded it. Before the afferent processes caused by movement of a joint can evoke a change in consciousness, they have already been integrated and brought into relation with the previous physiological dispositions, due to antecedent postural changes. Just as on a taximeter the measured distance is presented to us already translated into shillings and pence, so the final product of spacial changes rises into consciousness as a measured postural appreciation.

For this standard, against which all subsequent changes of postures are measured before they enter consciousness, we have proposed the word "schema." By means of perpetual alterations in position we are always building up a model of ourselves, which constantly changes. Every new posture or movement is registered on this plastic schema and the activity of the cortex brings each fresh group of sensations evoked by altered posture into relation with it. Immediate postural recognition occurs as soon as this relation is complete.

Recognition of posture and movement is obviously a conscious process. But the activities on which depend the

existence and normal character of the schemata lie for ever outside consciousness ; they are physiological processes with no direct psychical equivalent. The conduct and habiliments of the actor who appears before us on the stage are the result of activities behind the scenes of which we must remain ignorant, so long as we are only spectators of the play.[1]

[1] Op. cit., ii. pp. 722-24.

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